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AUTHOR Taylor, Arthur R.
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ABSTRACT

A feasibility study was conducted to identify alternative demonstration projects which would involve multitype (academic, public, and school) libraries in using the data transmission capabilities of the Institutional Communications Network (ICN) of Storer Cable to meet the information needs of schools and communities in Boone, Campbell, and Kenton counties in Northern Kentucky. Librarians developed a joint funding request to commission the study, which identified 17 alternative applications that could be tested in a demonstration project, and an evaluation methodology to be used by librarians in selecting an alternative. The study suggested that the ICN could be used for radio relay, audiovisual distribution, security purposes, energy management and monitoring, development of a teletext relay database, library usage data collection, software distribution, sub-minute facsimile, broadcast programming, training, telephone communications, electronic message board development, computer service access, electronic mail, videotext, document delivery, or teleconferencing. It was also suggested that the most promising alternatives were locally produced television programming and a shortwave radio relay service. This document presents a summary of the initial planning process for the study funding request, the request itself (Appendix A), and the final feasibility study report (Appendix B: "The Harnish Group Report"), which contains an ICN system overview, descriptions of the demonstration project alternatives and the proposed evalution criteria, and a 43-item bibliography. (Author/ESR)

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Libraries and Cable TV: Plans, Proposal, and Study to Explore Ways of Serving the Community's Information Needs Using the Data Transmission Capabilities of the Institutional Communications Network (ICN) of Storer Cable in the 1980's and 1990

by

Arthur R. Taylor

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IR 050 430

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ABSTRACT

LIBRARIES AND CABLE TV: SERVING THE COMMUNITY'S INFORMATION NEEDS USING THE DATA TRANSMISSION CAPABILITIES OF THE INSTITUTIONAL COMMUNICATIONS NET WORK OF STORER CABLE IN THE 1980's AND 1990's

INTRODUCTION: Storer Cable of Northern Kentucky is providing a special broadband two-way coaxial cable extending over an initial 66 mile area to tie together over 130 institutions, including public and parochial schools, police departments, fire stations, hospitals, libraries, and other public facilities within Kenton and Boone Counties. This unique installation within the continental U.S. is part of the total interactive cable system currently being installed. For the Institutional Communications Network (ICN) users the link is provided without charge for the duration of the franchise that Storer was awarded (until 1997). It has been left up to the institutions to provide the hardware/software to activate that capability. Librarians from Thomas More College, Northern Kentucky University, Kenton and Boone County Public Libraries, and Holmes High School have set about asking for monies as a cooperative venture to inaugurate a demonstration project of the ICN, a project that can eventually tie in all information/library agencies in the entire counties, and provide a model on a regional and state basis for other cooperatives to follow. The Campbell County Public Library System has been included as part of the initial project because by franchise ordinance Storer must interconnect with other cable systems, that is Storer of Campbell County and Metrovision of Newport, both of which systems have interactive capability.

NEEDS ASSESSMENT: A survey of the librarians mentioned concluded that the telecommunications link provided by Storer Cable would provide a transmission medium that would assist in improving service to current users, develop additional ones, save money, and better utilize current library staffs. Better communications would make it possible for the patron of the smallest library to have the same access to information as those at a large library.

GOALS AND PURPOSE: With this in mind, at a March 10, 1982 meeting of the librarians in the three county area determined that a feasibility study for the purpose of identifying the best possible demonstration capability of serving multi-type libraries should be undertaken immediately, followed shortly by the actual demonstration project. Action steps outlined to involve the other libraries not covered in the first project, and recommendations for systems development would follow.

OBJECTIVE: To commission a wualified consultant to do a six-week feasibility study involving multi-type libraries and their potential use of ICN cable technology in a demonstration project this summer or fall.

ACTIVITIES: Write proposal to possible funding sources for feasibility study; have consultant provide a report and presentation to all parties involved or potentially involved at the end of a six-week period on a "do-able" and expandable demonstration project; get hardware/software and participate in activities outlined as a result of the feasibility study.

PROCESS/PRODUCT EVALUATION: The project will be a success if funds are raised for a study among cooperating institutions and a feasibility study is completed by the end of 1982. The demonstration will be a success if the goals outlined in the study are met.

BUDGET:

GENERAL ELECTRIC SPECIAL GRANT FUND	$2500
KENTUCKY STATE LIBRARY	2500
	$5000 Total

PROJECT MANAGER: To be elected to work with Harnish Associates for duration of study.
PROPOSED TIMETABLE: September 1, 1982, funds received from all sources, start of study.
OPTIMUM DATES: October 31, 1982, study completed: November 15, 1982 report presented
EXPECTED COMPLETION AND REPORT BY December 31, 1982 at latest.
DATE PROPOSED: June 1, 1982

LIBRARIES AND CABLE TV: PLANS, PROPOSAL, AND STUDY TO EXPLORE WAYS OF SERVING THE COMMUNITY'S INFORMATION NEEDS USING THE DATA TRANSMISSION CAPABILITIES OF THE INSTITUTIONAL COMMUNICATIONS NETWORK (I.C.N.) OF STORER CABLE IN THE 1980's and 1990's

This paper summarizes the initial planning process, the written proposal, and the final report of the Harnish Group, of a feasibility study to identify a demonstration project to involve academic, public, and school libraries in using the data transmission capabilities of the institutional communications network (ICN) of Storer Cable to meet the information needs of the schools and communities of Boone, Campbell, and Kenton Counties in Northern Kentucky for the coming years.

The librarians developed a joint funding request (included in full as Appendix A) which was sent to state, local, and private agencies to commission a study that could provide a model on a regional and state-wide basis for other library cooperatives and networks to follow. The feasibility study identified 17 alternative applications for the librarians to review for a possible demonstration project. That report is included in its entirety as Appendix B. The positive results as well as a stumbling block to future development are summarized.

What follows is a brief review of the events that tied several libraries together over a fourteen month period, beginning in late 1981 and ending early in 1983. Those involved included the author, Mr. Phillip Carrico, Director of the Northern Kentucky Regional Library, Ms. Mary Ellen Rutledge, Acting Director of W.Frank Steely Library, Nothern Kentucky University, Ms. Carol B. Allred, Director, Chase Law Library, Northern Kentucky University, Ms. Jane Smith, Director, Boone County Public Library, Ms. Beverly Bury, Director, Campbell County Public Library, Mr. Lee Goodeman, Librarian, Holmes High School, Covington, and Mr. Mike Averdick, Associate Librarian, Kenton County Public Library. Both General Electric Company of Cincinnati and the Kentucky Department for Libraries and Archives entered the picture midway and insured the success of the venture by funding the first step in the development of an electronic communications network.

The initial interest was triggered by the Storer Cable's inclusion of a two-way institutional network, covering the three counties of Boone, Campbell, and Kenton, as part of their franchise agreement made in December of 1980. The system was meant to facilitate continuing professional education, provide for discrete programming between or among institutions, and give an opportunity for electronic communications to take place.

At a fall, 1982 meeting of library directors called by the author with the encouragement and backing of the Kenton-Boone Cable Board Administrator, Jayne Gerdeman, they first reviewed the possible ways that the public, school, and academic libraries might cooperate and improve services to each of their clienteles. The cable lines themselves and a drop to each library was being provided without charge for the life of the franchise. It was up to them to provide the hardware and software to use that "electronic conduit." One of the ideas that came to the forefront was the concept of exploring the new medium's, cable television's, broadband capability of transmitting computer generated data from one location to another and in a reciprocal fashion. Could the theory become reality for them? The opportunity was truly unique: there was,at the time, no other franchise in the United States that covered a three county area with such a single network capability without interconnect problems. Further, the opportunity was challenging, as whatever way the libraries might experiment with communications, it might provide a model for other regions in the state of Kentucky, for the libraries' mutual cooperative (the Greater Cincinnati Library Consortium--GCLC), or for other library networks.

Based on the responses generated at the first meeting a subcommittee was formed to work on details and priorities. The first priority recommended, and accepted in March, 1982, was that a feasibility study be undertaken to determine the real potential of using the Storer Institutional Communications Network (ICN) to interconnect multi-type libraries for non-video uses of the cable system. How that might be done would have to be the work of professionals

and so it was recommended to the group to investigate using the individuals who did the pioneering work on Channel 2000 for OCLC be approached. In May, 1982, Jayne Gerdeman and Art Taylor met with Tom Harnish and Mark Bendig who were quite excited about the new window opening for Northen Kentucky Librarians and their clienteles. The Harnish Associates (later,Harnish Group) recommended a Phase One Study to review materials, see what else was going on and what worked. That first rough cut of the alternatives would identify the best options it was felt. The Second Phase would then be to do one of the options as a hands-on project that would involve multi-type libraries cooperating in something "small" but tangible, and highly visible. With such a project completed, the local Cable Board and others could be approached for additional funds for the project expansion. The librarians met on May 12, and agreed to go ahead with a Phase One Proposal. The draft of the proposal was finalized at the June 1st Meeting.

The next task, then, was to identify funding sources to pay the consultants fees for the Phase One Study. On June 10th Mr. Phillip Carrico, Director of the Northern Kentucky Regional Library System, sent letters to the Kentucky Department for Libraries and Archives, Storer Cable and others. The author wrote a grant proposal requesting matching funds from the General Electric Special Grant Fund for Higher Education Institutions in the Cincinnati Metro area. In July part of the matching funds were committed by Mr. James A. Nelson, State Librarian and Commissioner. The press was notified of this newsworthy event and both the Kentucky Enquirer and Post as well as the Boone and Kenton County Recorders wrote it up.

The momentum was briefly slowed as Storer Cable of Northern Kentucky wrote that their predetermined budget "regretfully... cannot include the additional funding of such projects although seemingly beneficial." They were "hopeful that this denial will not suppress your development in the usage of cable."

The other good news came in late Septerber that

General Electric Company's Special Grant fund had given approval for matching funds. They wrote, "We are excited about your project and hope it will set a standard for future projects." The librarians reassembled October 13th and reviewed the proposal they had drafted and made some final revisions for the study. On November 10th the Harnish Group returned with a contract and in December began their work.

On January 27, 1983, the Harnish Group gave their oral presentation of the Phase One Study sent to the librarians just a week before. They summarized their findings and gave strong emphasis to the criteria outlined by the librarians. They presented 17 options to the librarians. The alternative applications included: radio relay, audio/visual distribution, security, energy management and monitoring, teletext relay database, library usage data collection; software distribution, sub-minute facsimile, programming, training, telephone, message board, computer service access, electronic mail, videotex, document delivery,and teleconferencing. For each option the consultants reviewed the considerations involved in implementation, what the costs, visibility, and future would be, and the necessary technical requirements needed for the ICN to operate through Storer. The librarians were then asked to review their priorities in light of their findings, and return for a discussion of specifics in one or several areas.

To do this, the librarians were given a new product evaluation methodology developed by the Harnish Group. At the outset organizational strategies, goals and objectives capabilities and resources were determined, and combined with existing and forecast needs, target market information, possible solutions, and decisions to define opportunities. When opportunities and organizational requirements were established, then decision factors and considerations could be defined. Those decision factors boiled down to three basic questions: Is it real? Can we win (Is it do-able)? and, Is it worth it? The paper then spells out the detail behind the decision factors. A chart was included to indicate how they had perceived the librarians' priorities,

and a duplicate but blank chart was included for them to establish their own priorities now that they had reviewed the options more in depth.

The study showed one option that had been considered a real possibility, was in fact, not. That option was, if the librarians wanted to use the cable system, it was too soon to rely on it for digital transmission of data for purposes of circulation control. The example of one library system's experience was given as an example. For this information alone, even though negative, was a positive contribution to avoid the loss of much time and many dollars spent in the wrong direction-- at this point in time.

After the librarians further reviewed the study, the Harnish Group returned February 16th to give the librarians some suggestions on a item that perhaps they could move on immediately, even with the ICN difficulties outlined in the study. That item was electronic mail. The proposal was to approach vendors of switching equipment and modems and see if they would like to use the ICN system as a testing site, and the librarians as prototype evaluators. The initial queries made by the Cable Board Administrator however, seemed to indicate that the vendors were interested in much larger systems and greater usage than that the libraries could provide at this time. Microcomputers were discussed as possible communications links but no further action was taken at this time.

In March of 1983, another option was taken, not just with northern Kentucky Libraries, but with libraries of the Greater Cincinnati Library Consortium in conjunction with the University of Cincinnati. That option was to make a preliminary committment to join them in a regional online public access catalog, and for Kenton County Public Library, circulation control as well, scheduled to be operational in mid-1985.

The study,then, had several beneficial results. The librarians from the multi-type libraries found themselves working

and planning quite well together. It was,perhaps, even a factor that led the libraries in the tri-county area to join the metro cooperative, GCLC. Finally, the Phase One study provided the impetus for a study to be undertaken by the Automation Division of GCLC to determine what reliable medium could in the very near future provide digital transmission of computer data reliably among themselves. It even got a representative from Warner-Amex, New York, to talk to them about the business ICN they are considering developing and how the librarians might benefit!

The grant,then, provided for a study that gave a realistic look at the cutting edge of a new high technology. Most of all it gave several librarians working with the author a chance for growth in cooperation and mutual goal setting. Indeed, the funds provided by the General Electric Company and the Kentucky Department for Libraries and Archives were well spent.

June 30, 1983

Dr. Arthur R. Taylor, Ed.D.
Director, Learning Resources Center
Thomas More College
Crestview Hills, Kentucky

Appendix A: Libraries and Cable TV: A Multi-Source Funding Proposal to: General Electric Grant Fund; Storer Communications of Northern Kentucky; Kentucky State Department of Libraries and Archives; and Participating Library Administrations.

LIBRARIES AND CABLE TV: SERVING THE COMMUNITY'S INFORMATION NEEDS USING THE DATA TRANSMISSION CAPABILITIES OF THE INSTITUTIONAL COMMUNICATIONS NETWORK (ICN) OF STORER CABLE IN THE 1980's and 1990's

A FEASIBILITY STUDY TO IDENTIFY A DEMONSTRATION PROJECT INVOLVING THE LIBRARIES OF THOMAS MORE COLLEGE, NORTHERN KENTUCKY UNIVERSITY, BOONE, CAMPBELL AND KENTON COUNTIES, AND HOLMES HIGH SCHOOL.

A MULTI-SOURCE FUNDING PROPOSAL TO:

GENERAL ELECTRIC SPECIAL GRANT FUND

STORER COMMUNICATIONS OF NORTHERN KENTUCKY

KENTUCKY STATE DEPARTMENT FOR LIBRARIES AND ARCHIVES

AND PARTICIPATING LIBRARY ADMINISTRATIONS

BY

Dr. Arthur R. Taylor, Director
Learning Resources Center
Thomas More College

Mr. Phil Carrico, Director
Northern Kentucky Regional Library

Ms. Mary Ellen Rutledge, Acting Director
W. Frank Steely Library
Northern Kentucky University

Ms. Carol B. Allred, Director
Chase Law Library
Northern Kentucky University

Ms. Jane Smith, Director
Boone County Public Library

Ms. Beverly Bury, Director
Campbell County Public Library

Ms. Mary Ann Mongan, Director
Kenton County Public Library

Mr. Lee Goodeman, Librarian
Holmes High School, Covington

June, 1982 (as Revised October, 1982)

INTRODUCTION

In January of this year the Northern Kentucky Regional Library Director the librarians of Thomas More College, Northern Kentucky University, Covington Holmes High School, and Boone, Kenton, and Campbell counties have been discussing libraries' communication needs and ways to solve them. The priorities of the group are to utilize the technology currently available to speed up interlibrary loans, exchange information, and improve service to their clientele. There is a new technology that will wire all institutions in the neighboring counties together which potentially can provide the capability of a new mode of communications: the Institutional Communications Network (ICN) of Storer Cable of Northern Kentucky. The Kenton-Boone portion of this broadband coaxial cable link, initially 66 miles, is being provided without charge for the duration of the franchise to over 130 institutions, including public and parochial schools, police departments, fire stations, hospitals, libraries and other public facilities, Campbell County mileage (35) will greatly expand this initial ICN mileage figure. Storer promises and has reiterated it at the most recent Cable Board Meeting, to use this franchise to project a futuristic image into today's reality. Storer says this will be their best system. It has the potential to develop the ICN into a model system. The librarians want to assist in this development.

The librarians are well aware of the system's uniqueness in coverage: an initial two county area that includes over 25 municipalities, several with rapidly developing populations. The librarians are strong in their commitment to serve the needs of the community and see themselves in a unique time and place to be able to address those needs better with the new cable technology. Further, while there are many libraries that have grouped together into consortia and cooperatices for the purposes of inter-library loans, information exchange, and so on, there are none as yet identified as using the cable system as an ICN.

The computer is a powerful tool in library work. A national bibliographic network provided by the Online Computer Library Center (OCLC) has developed a system tying together over 3,000 differing kinds of libraries. The system has identified over 8 million items, most of which can be loaned from one library to another. But the service is expensive and since the service is via long-distance telephone lines for everyone but those in the metro-Columbus, Ohio area, the cost is even greater.

Many libraries in the Greater Cincinnati area have formed a local consortium. They communicate via the telephone, and exchange information via UPS and USPS. Interlibrary loans are handled among eight

of the 27 libraries by a telefacsimile device, called QWIP. to exchange book and magazine title requests on a weekday basis.

The concept of using a broadband coaxial cable for daily communications among Northern Kentucky libraries is a cooperative communications process. Demonstration of an enhanced communication system over the ICN is timely. Broadband cable currently used in the two-way interactive systems is capable not only of sending audio and video transmission but more importantly simultaneous data communications tramsmission. Libraries in Northern Kentucky want to activate such channels utilizing proper equipment. Such a communications system of the ICN is a drawing card for better and more frequent use of libraries in the area. It could provide additional subscribers for Storer Cable, as well as establish the libraries as responsive service agencies to the community at large. As the first group to establish such a broad ICN, local, regional and potentially nationwide attention will focus on the ICN's capability of being effictively used in many other communities. The attention will benefit all involved.

NEEDS ASSESSMENT:

The librarians are looking to the cable medium for three reasons: to improve service to present library users and attract others, to save money, and to better utilize staffs. These three needs were identified after much discussion and several meetings. All the librarians felt that their clients wanted information in a variety of formats, such as magazine articles, books, and so on, much more quickly. The library staff on the other hand, can be better used if less time is spent on answering routine questions. If there is a potential for quicker and better communications among area libraries of all kinds, then a needed information item not available in a local library can be obtained from the nearest library, and reduce the demands made on the larger institution. The cable ICN is seen as potential solution to both of these problems. The ICN makes it possible for the user in the smallest library to have immediate access to information located in any partici[illegible]g library.

Desired outcomes include (as [illegible]sed: October, 1982):

1. Fascimile transmission from point to point. This would mean that one could request a magazine article from another institution and get a printed copy, within a day or even an hour.
2. An online catalog of materials held by participating libraries and a common automated circulation system with resources shared

by interlibrary loan, using an in-place delibery system.

3. Hardware for both librarians and users to interact directly with the computer system. The users would have access terminals to insure maximum availability with a minimum of time and training.
4. Access to other online data bases.
5. Access to local data bases online, such as the Kentucky Post indexed by the Kenton County Public Library, or the Holmes Castle collection from Holmes High School, and so on.
6. Decision making information which would allow other institutions to participate.

OBJECTIVE OF THIS PROPOSAL

To commission a qualified consultant to do a six-week feasibility study involving multi-type livraries and their potential use of ICN cable technology in a demonstration project this summer of fall.

PERSONNEL TO IMPLEMENT THIS OBJECTIVE

To meet the portion of the objective that calls for a "qualified consultant," the librarians elected to contact The Harnish Group. The accompanying biographies briefly sketch the excellent qualifications of Mr. Thomas D. Harnish and Mr. Mark W. Bendig. At an initial interview, Mssrs. Harnish and Bendig's enthusiastic response to the librarians' interest in activating the ICN prompted their interest and willingness to undertake such a feasibility study.

ACTIVITIES TO MEET THIS OBJECTIVE

The consultants The Harnish Group will undertake a six-week feasibility study that incorporates their findings from (1) a review of existing, related materials including documentation of work and meetings that have taken place to date, statements of goals, objectives and views of interested libraries; (2) a survey of existing or planned cable/library system uses of institutional communication networks from whose experience they intend to draw on.

The Harnish Group's report will be expected to (revision as of October, 1982) (a) identify two to five alternatives for a demonstration project with associated cost estimates and staffing requirements for a cost effective, highly visible project involving multi-type libraries in Northern Kentucky;

$(b)_1$ report on the on-site proparations that would be needed to implement the alternatives both at the CATV headend and at the participating institutions; $(b)_2$ identify specific institutional, corporate and governmental sources interested in funding communications projects involving multi-type libraries in the current (1982-1983) or coming fiscal year (1983-1984); (c) identify ways that the alternatives will contribute to the building of a communications system, with or without a CATV/ICN link which meet the desired outcomes as listed in the needs assessment outlined above. (d) establish what interest exists on the part of several manufacturers to contribute to the chosen projects with expertise, equipment, and liaison with Storer Communications and the libraries involved.

In Summary:

A. The Harnish Group will provide a written report and oral presentation to all parties involved, or potentially involved, within six weeks of the completion of the study.

B. The Harnish Group will outline the necessary steps for implementing the ICN demonstration project as soon as possible.

C. (Revision as of October, 1982) The Harnish Group will recommend a specific evaluation methodology to establish whether or not a selected alternative's use of the CATV/ICN transmission capabilities will result in more efficient and effective delivery of library services vis a vis other methods.

TIME TABLE:	September, 1982	Study Begun
:	October 31, 1982	Study Completed
:	November/December	Oral Report
:	December/January	Written Report To All Parties, That is Libraries and Funding Agencies

EVALUATION

The feasibility study commissioned by the librarians will be considered a success if it meets the points outlined above.

BUDGET

General Electric Special Grant Fund	$2500
Kentucky State Library	$2500
TOTAL	$5000

BUDGET ACCOUNTING: Receipt from The Harnish Group "For Services Rendered," that is, completing and reporting the feasibility study to interested parties orally and in writing.

Appendix B: Library Applications for the Storer Institutional Cable Network. Suggested Applications and Evaluation Technology. The Harnish Group Report.

LIBRARY APPLICATIONS
FOR THE
STORER INSTITUTIONAL CABLE NETWORK

Suggested Applications
and
Evaluation Methodology

January 21, 1983

THE HARNISH GROUP

THE HARNISH GROUP

Busch Corporate Center
1080 Kingsmill Parkway
Columbus, Ohio 43229
614/431-0333

January 21, 1983

Philip N. Carrico
Regional Librarian
Northern Kentucky Regional Library System
5th & Scott Streets
Covington, KY 41011

Dear Phil:

It has been a pleasure to study the potential library applications of the Storer Institutional Cable Network. We found it professionally satisfying to analyze the opportunities offered by the ICN, and evaluate the most promising applications. We have tried to take a constructive approach that realistically assesses the advantages and disadvantages of each application.

We believe that the prospects for participating libraries to reach a consensus on one or more applications which will have real benefit for library patrons is very high. Based on our experience, we advocate a 3-step, phased design approach, with distinct, sequentially dependent development steps. The phased design process is not our innovation, but a standard process which has been applied successfully to other system developments. It has proven itself well worth the extra front-end investment in avoidance of last-minute cost escalations, performance shortfalls, and schedule slippages.

Our report describes institutional cable network technologies, and the Storer implementation. It includes a detailed description of 17 alternative applications, and a specific methodology for evaluating which of the applications is most promising. To do our job, we had to state the problems, opportunities, and the issues involved in developing a library ICN application as we saw them. In our judgment, this candidness was an assignment imperative; no criticism is intended. It is our hope that our recommendations provide the insight you sought.

I'd like to express our appreciation for the professional, cooperative support we received from Jayne Gerdeman, and the technical and management personnel at Storer. They clearly have a substantial investment in your project and a deep commitment to its success.

We look forward to meeting with you on January 28 to discuss this report. In the meantime, if there are any questions, please do not hesitate to call us at (614) 431-0333.

Very truly yours,

T. D. Harnish

/cb
Enclosure

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EXECUTIVE SUMMARY

Storer Cable, as part of its cable franchise proposal and subsequent contract, has provided libraries with free use of a broadband institutional cable network (ICN). The capability of the network to communicate audio, digital, and video signals among community institutions and in some cases, cable subscribers offers the opportunity to reduce library communications costs, increase patron and technical services, and improve staff efficiency.

Comprised of three physical cables, Storer has proposed the assignment of 16 downstream channels and 17 upstream channels for institutional use. One 6 MH_z channel has been tentatively assigned for library use.

Although the telephone has traditionally met most communications needs, increasing costs and decreasing availability has created a need for an alternative. While microwave may sometimes be appropriate, the high cost of microwave installations and certain technical considerations make it an unlikely candidate for library use.

By reviewing requested or proposed ICN applications from several cities, and the use of a proprietary information processing taxonomy, 17 potential applications have been identified. Each application is described, and a discussion of the advantages and disadvantages, primary beneficiary, initial and operational costs, public relations value or visibility, future growth opportunities, and bandwidth requirements of each application is included.

Each application is evaluated using a methodology which is described in detail. Provision has been made for participating libraries to evaluate the alternatives independently, to encourage consensus.

Review of the possible applications by the participating libraries, and use of the evaluation methodology independently and collectively may result in the identification of additional applications. Use of the described evaluation methodology is encouraged for that purpose.

Based on the authors' evaluation of the potential alternatives, locally produced television programming and a short-wave radio relay service appear to most closely match the selection criteria established by the participating libraries before the study was conducted.

"This instrument can teach, it can illuminate; yes, and it can even inspire. But it can do so only to the extent that humans are determined to use it to those ends. Otherwise it is merely lights and wires in a box.

Edward R. Murrow, 1958

I. INTRODUCTION

In a special golden anniversary issue two years ago, the editors of Business Week magazine predicted telecommunications would emerge as one of the "super industries" over the next 50 years. After years of relying principally on the telephone, broadcasting, and print media to satisfy communications needs, two-way cable television, videotex, low powered TV, cellular radio, videoteleconferencing, and direct broadcast satellite would provide new ways to send and receive information.

Whether or not the Business Week forecast is correct, Edward R. Murrow's observations about television in 1958 seem equally applicable to the whole spectrum of today's new telecommunications and information products and services. There is great potential for libraries to play a role that ensures the cable communications derivative of television is more than "lights and wires in a box."

Against this background of opportunity and rapid technological change, Northern Kentucky Regional Library system and participating libraries from Kenton, Boone, and Campbell Counties have seized an opportunity to play a pivotal role in determining how communication technology will be used.

Storer Cable's Institutional Cable Network (ICN) located in the three-county area is available to participating libraries free of charge. A potentially significant resource, the communications capabilities represented by broadband (cable) networks are extensive. Although cable networks in the U.S. today are primarily used to distribute entertainment television and occasionally security services, the participating libraries recognized the potential of the Storer Institutional Communications Network for the library and its patrons. They also recognized, however, that "potential" is something different from reality.

A. Purpose of the Study

This study, then, has been conducted to identify alternative applications which could take advantage of the available institutional loop. In identifying alternative applications, the participating libraries made it clear the alternatives should:

- be in line with their institutions' goals, objectives, and views.
- provide visible benefit to library patrons.
- at a minimum, be the first step in an evolutionary development process and not a "one shot" test.
- be "do-able;" that is, an operationally, technically, and financially feasible project for the participating libraries.

B. Description of Report Contents

The first section of this report describes the Storer ICN. Included in this description is a general overview of institutional communication network technologies and specifics of the Storer ICN system architecture. The next section describes technical and operational factors which must be considered wen contemplating ICN applications. After looking at institutional networks in general, Storer's ICN in particular, and reviewing ICN considerations, 17 possible library applications are described. Next, an evaluation methodology and selection criteria used to identify feasible alternatives are described. The methodology is applied using the authors' selection values to arrive at a set of favored alternatives. Provision is made for participating institutions and readers to apply their own selection values and independently evaluate the alternatives. The final section brings together, in summary, the conclusions of the study.

II. SYSTEM OVERVIEW

As part of its CATV franchise agreement Storer Communications has promised to provide an institutional communications network which will interconnect various municipal agencies (libraries, schools, hospitals, etc.) and permit them to communicate with each other. Such communications may be in the form of video, audio (voice), or digital data, depending on the nature of the interface equipment connected to the ICN at the transmitting and receiving points.

The Storer cable system proposed for installation actually consists of three separate cables, designated A, AA, and B by Storer. The A and AA cables each carry 40 channels in a "downstream" direction (from the cable company "head end" to the subscriber). Of these 80 available downstream channels, 10 channels on the A cable and 6 channels on the AA cable are reserved for ICN service. The signals on these 16 channels are "scrambled" and whether audio, data or video, they cannot be received by a subscriber decoder. Storer has promised to provide a descrambler to all ICN participants.

In addition to the downstream channels, a portion of the available frequency spectrum on the A and AA (subscriber) cables is reserved for "upstream" transmission from the subscriber decoder to the head end. This capability may be used by Storer for interactive programming (collecting viewer responses), home security, or home information services such as videotex. The proposed system also includes teletext capabilities which can be used to transmit text and graphics from the head end.

The B cable is only available to ICN participants. It provides 17 "upstream" channels over which signals may be sent from the ICN participant site to the head end. A switching arrangement at the head end permits any of the 17 upstream (incoming B cable) ICN channels to be sent out (downstream) in scrambled form on any of the 16 ICN channels on the A and AA cables. It is also possible to descramble incoming ICN video at the head end and transmit it on one of the subscriber channels on the A or AA cable. In this way, "public access" programming may originate at an ICN participant site for distribution to subscribers throughout the system on one of the access channels reserved for such programming. Technically, of course, it is also possible to transmit data and audio from an ICN site through the head end to subscribers, but the subscriber must have certain equipment to use the transmitted signals.

The ICN arrangement described above must be shared among all agencies participating in the ICN. It is not clear from the Storer proposal exactly how or by whom the allocation of channels is to be accomplished. Storer has, however, provided "suggested" allocations for the only 16 downstream ICN channels available. The suggested allocation for libraries is channel A37 (channel 37 on the A cable). Storer makes no suggestions regarding the allocation of upstream channels on the B cable. With 16 "downstream" and 17 "upstream" channels there is potential for allocation problems.

A. ICN Components

Figure 1 is a simplified diagram of the proposed Storer cable system. Two ICN participant sites and two regular subscriber sites are shown in the figure, as well as the interface and display equipment that might be found at each type of site.

The cable subscriber is provided with a Decoder to which the A and AA cables are connected. The Decoder is connected to the antenna terminals of the subscriber's television receiver. The Storer decoders may be programmed for Universal Service, Economy Service, Basic Service, or Full Service, as described in the Storer proposal. Increasing levels of service provide additional available channels for an additional monthly cost. Switches on the Decoder permit the subscriber to select among the channels available at a given level of service.

ICN participant sites are connected to the A and AA cables for reception of the (scrambled) downstream ICN channels and are also connected to the B cable for upstream transmission, as shown in Figure 1. The Decoder and TV shown in dashed lines at the ICN participant site are optional with respect to ICN usage; as a byproduct of the system design, each ICN participant can receive and display any of the permitted subscriber channels on the A or AA cable. Each ICN participant is to be provided with a descrambler to permit reception of the 16 downstream channels reserved for ICN use. The output of the descrambler may be connected to a television receiver if the channel is being used for video, or to a special "demodulator" if the channel is being used for audio or digital data. A "modulator" is used to transmit video, audio, or digital data upstream to the head end on the B cable, as shown. Storer has promised to provide a total of seven video modulators to various unspecified ICN participants. Additional video modulators as well as audio and digital data modulators can be purchased from a number of sources for prices ranging from several hundred to several thousand dollars.

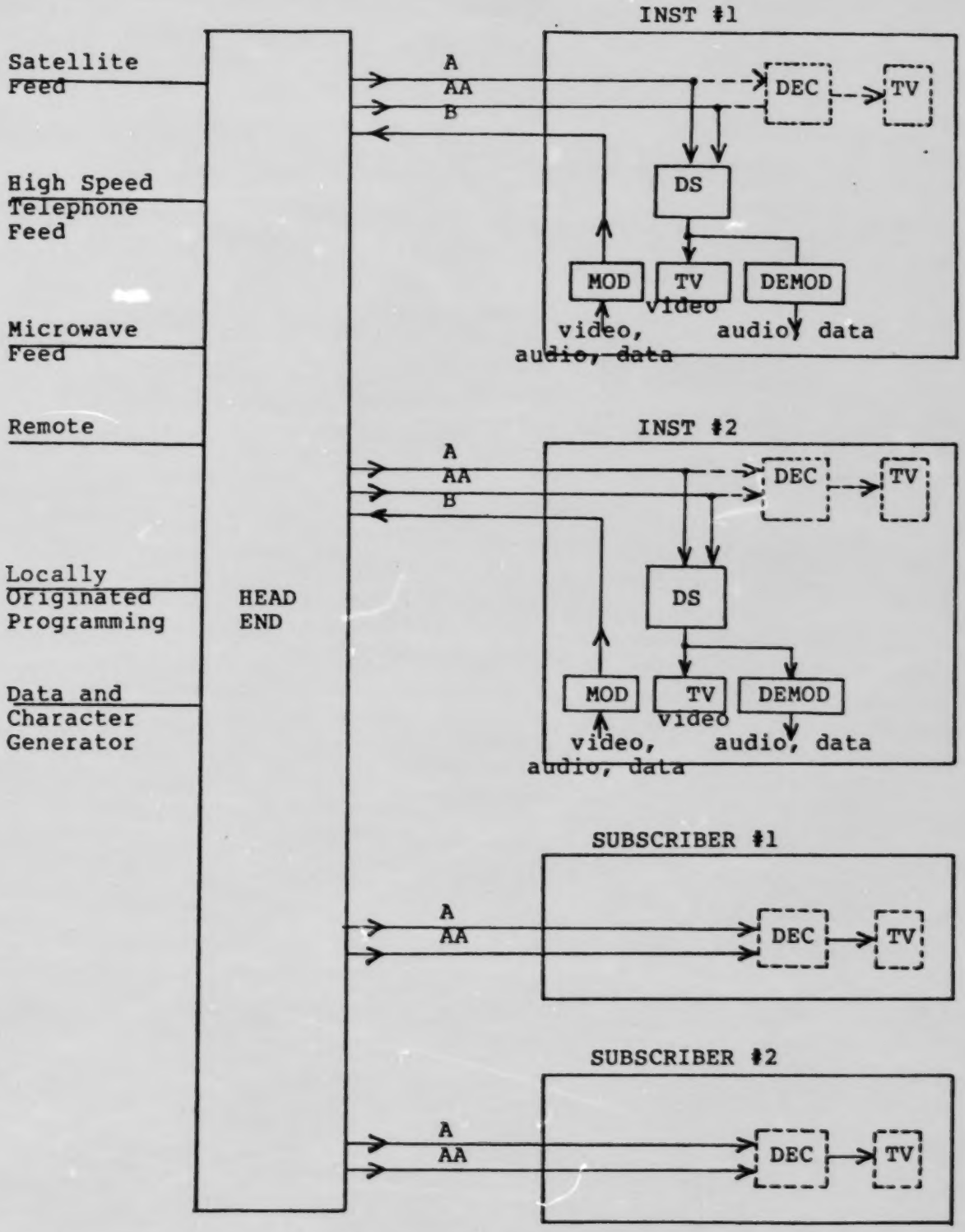

FIGURE 1
Simplified System Diagram

Figures 1a through 1c illustrate signal flow patterns for various modes of ICN usage. Note that the Storer system provides only a conduit for the communication of information; any processing of this information (entering, displaying, printing, storing, etc.) must be performed by equipment entirely separate from the Storer system. The cable interface equipment - the modulators and demodulators shown in the figure - forms the boundary between the communications system (provided by Storer) and the information processing systems (provided by the institutional users themselves).

B. Capabilities and Limitations of the ICN

To effectively evaluate potential applications of the Storer ICN, an understanding of the capabilities and limitations of the system is essential. While there is little doubt of the potential value of a free communications facility, it must not be considered a panacea. Specifically, then: Just what **can** an ICN do, and what **can't** it do?

(1) Capabilities

The bandwidth of a coaxial cable-based communication system constitutes the primary advantage of such systems over telephone-based approaches to communications. The capacity of a communications link (that is, the link's capacity to carry multiple signal transmissions simultaneously) such as that provided by the Storer ICN is referred to as bandwidth. Any signal transmitted over a telephone wire, cable network, or broadcast over the airwaves takes up a certain amount of "space" in the electro-magnetic frequency spectrum. Bandwidths of certain typical signal types are listed below:

Voice (telephone)	3000 H_z
AM radio station	10 kH_z
High-speed digital data	100 kH_z
FM radio station	150 kH_z
TV (video) signal	6 MH_z

NOTE: Frequency is measured in Hertz (H_z), where:

1 H_z = 1 cycle per second
1 kH_z = 1,000 H_z
1 MH_z = 1,000 kH_z = 1,000,000 H_z

The Storer ICN and subscriber network cables, each have a total available bandwidth of about 300 MH_z. Approximately 40 full-bandwidth TV channels may be transmitted "side by

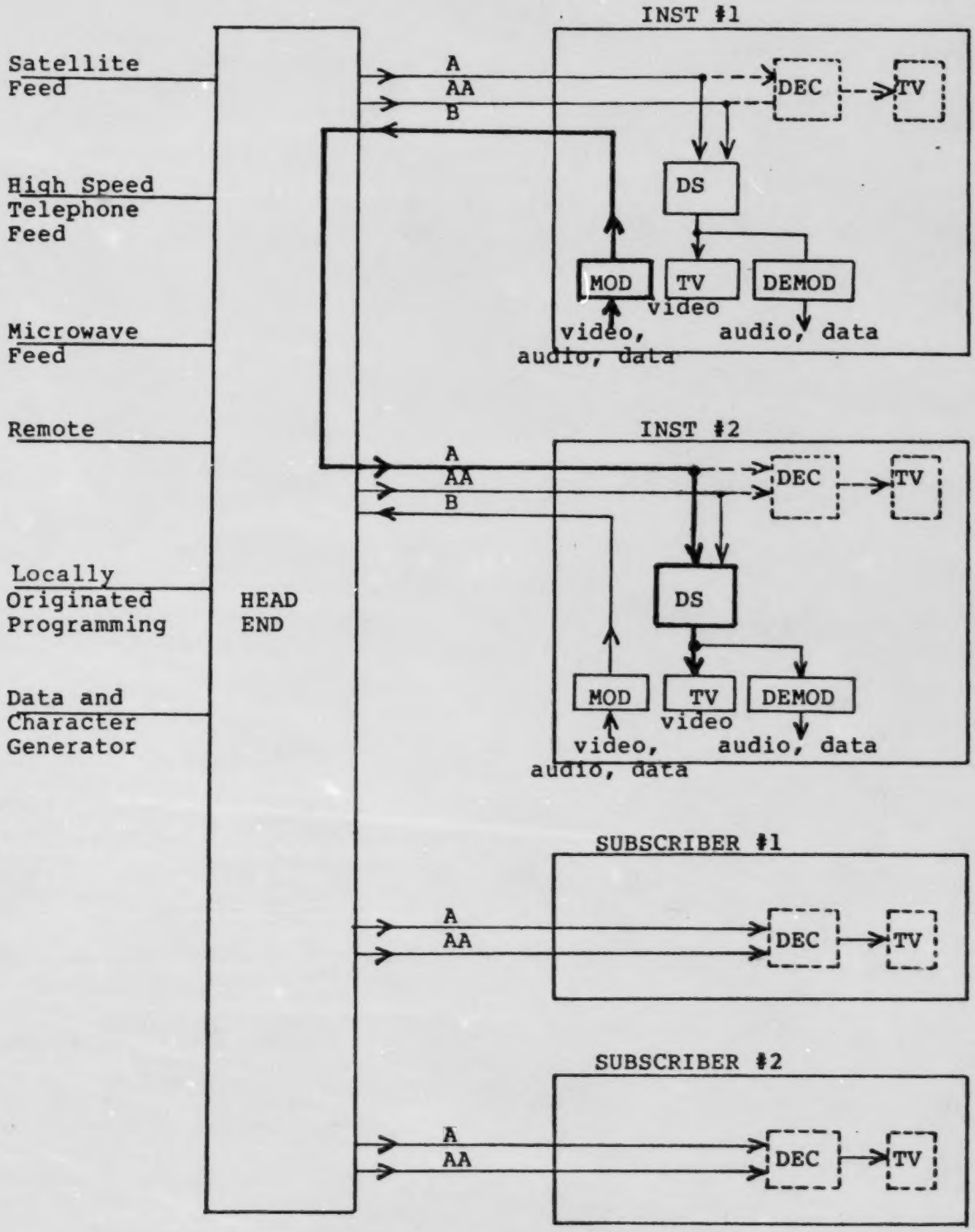

FIGURE 1a
Inter-Agency Video

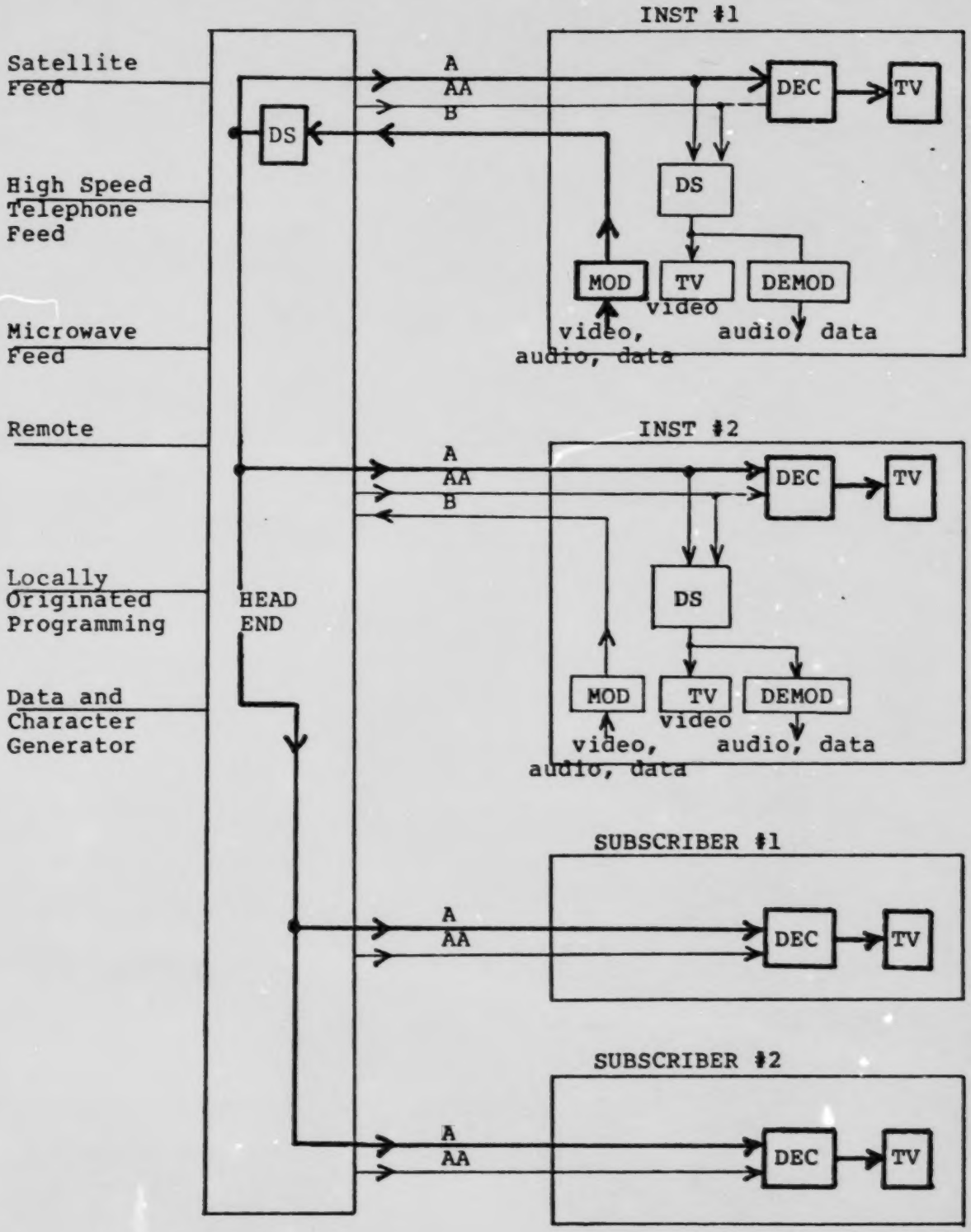

FIGURE 1b
Public Access Video

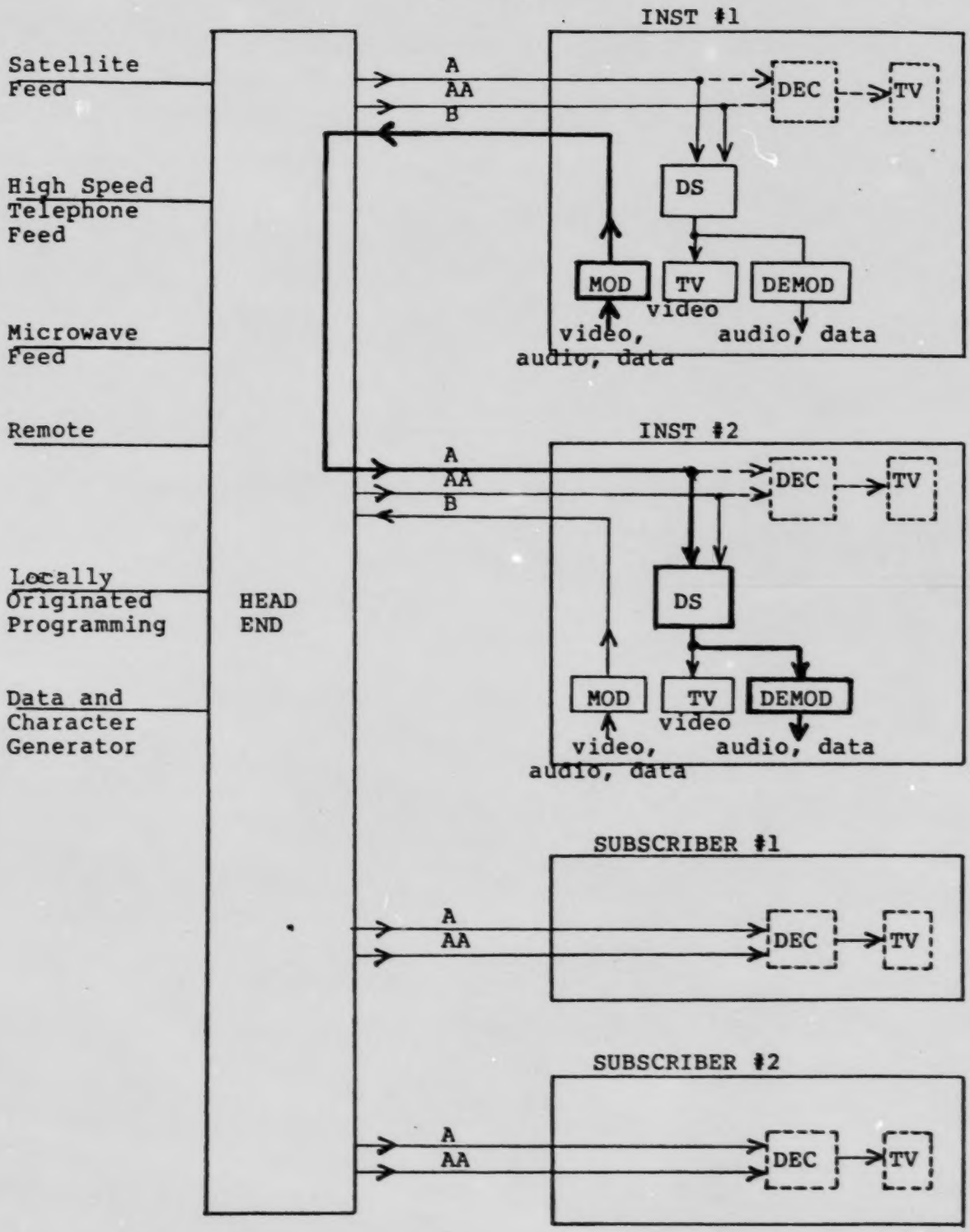

FIGURE 1c
Inter-Agency Audio or Data

side" in the spectrum available on each physical cable. The specific frequency assignments (which channels occupy which frequency "slots" in the available bandwidth) are made by the cable company. A given 6-MH_z slot or channel, once assigned, need not necessarily be used for television programming, which would occupy the entire channel, but may be divided into many narrower subchannels, each capable of transmitting, say, a single voice signal. Thus, the division of a given TV channel into subchannels is analogous to the division of the overall cable spectrum into TV channels.

Figure 2 illustrates the concepts discussed above in a simplified manner. Any or all of the video channels may be divided into subchannels as shown for channel 3 in Figure 2.

A single, standard dial-up telephone link established via the PSN (Public Switched Network) is capable of handling (a) limited-fidelity audio (e.g. an ordinary telephone call), or (b) digital data transmitted at rates of up to 120 characters per second. It is not possible to transmit full-motion video over a telephone link due to its narrow (3000 H_z) bandwidth. Facsimiles of documents or photographs and slow-scan television pictures may be transmitted via telephone, although it typically takes from one to three minutes. Again, the limited bandwidth or capacity of the telephone link is the reason.

In contrast to the 3000 H_z bandwidth of a telephone link, a coaxial cable system offers a potential bandwidth of over 300 MH_z (1 MH_z = one million H_z). Naturally, the entire bandwidth of the cable system cannot be made available to a single institutional user. But even a single 6-MH_z channel, such as has been allocated to libraries by Storer, represents 2,000 times the bandwidth of a single telephone line. This means that, in principle, 2,000 separate telephone conversations could be simultaneously carried within the single allocated channel. Alternatively, the same channel could handle about 50 high-speed digital data links. Full-motion video (television) has such extremely high bandwidth requirements that one ICN channel can carry only one full-motion video signal.

(2) Limitations

It is in the area of channel usage for the various communications formats that the first limitation of the ICN enters the picture. If, for example, it is determined that the ICN will be used as the data communications portion of a

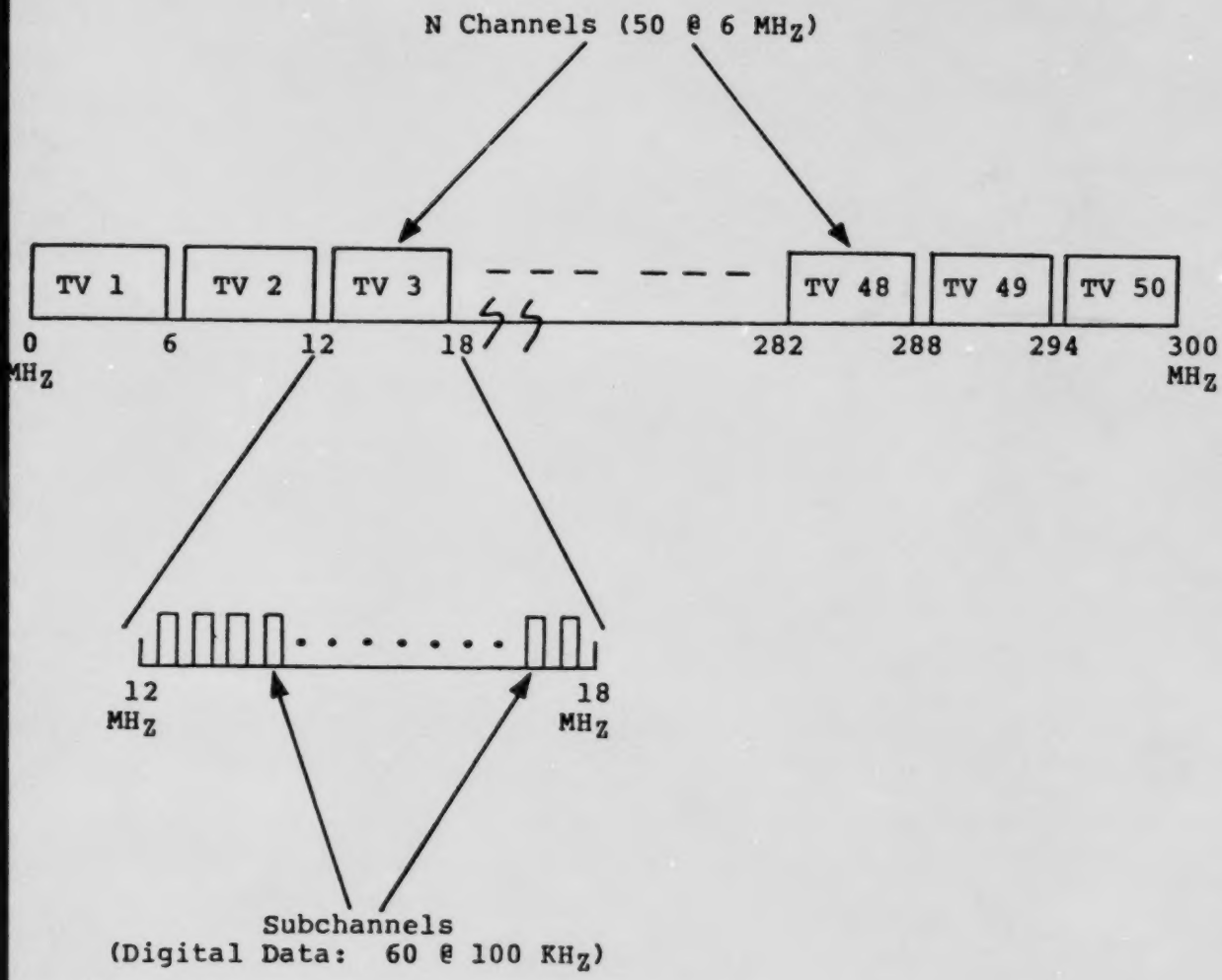

FIGURE 2

ICN CHANNEL ALLOCATION

regional library circulation system, then the available channel cannot simultaneously be used for training, programming, teleconferencing, or any other application requiring full-motion video. In general, the use of any portion of a given ICN channel for audio or digital data signals eliminates the simultaneous use of that channel for video transmission. Technically, of course, the ICN could be used for several applications which require less than full bandwidth, and each application could be assigned the necessary bandwidth or subchannels. (The challenge in such a case would be one of management.) Of course, Storer could allocate more than a single ICN channel for use by libraries. If a second channel were to be made available, one channel could be used for video transmissions and the other used for clusters of low-bandwidth (audio and/or digital) transmissions as discussed earlier.

It must not be forgotten that the proposed cable linkage is, in fact, only an electronic "pipe" and nothing more. In order to integrate this pipeline into a large-scale system; such as the regional circulation system mentioned above, two elements are required: (a) an interface unit, or modem (modulator/demodulator), must be installed for each interconnection to the ICN and (b) the large-scale system itself must be designed and implemented.

(a) Interface Requirements

With respect to the former point, a variety of cable interface equipment is available on the open market. Equipment designed to interface video, audio, or digital data sources to the cable and vice-versa typically cost two thousand to three thousand dollars per unit. Storer has proposed to provide seven video modulators to be distributed among ICN participants. This particular piece of equipment is limited to applications where it is desired to originate video programming at an ICN participant site for transmission to one or many other ICN sites or for broadcast via a public access channel on the subscriber network. Any non-video application (some of the more promising ICN applications) will require the purchase of special interface equipment beyond that which Storer proposes to provide.

(b) Storer Requirements

The second element required for the integration of the ICN with a large-scale distributed information processing system is the design and implementation of the large-scale system

itself. This seemingly obvious point is easy to miss amidst the potential of the ICN.

The situation resembles the case where, say, 10,000 books are donated to a community without a library. Superficial consideration may make it seem as if the main obstacle to having a town library has been overcome. It would soon become apparent, however, that a collection of books is necessary -- but not alone sufficient -- to permit the delivery of library services to the community. In fact, when all is said and done, it might well be concluded that the acquisition of books and other materials is actually one off the least complex aspects of establishing a library. In much the same way, a "panacea syndrome" must be avoided when analyzing ICN applications which require the creation of a technical and organizational infrastructure where none has previously existed.

(c) Operational Issues

A final set of limitations on the usability of an ICN for library communications concerns the reliability associated with the cable system itself and its administration by the cable company (Storer, in this case).

(i) Ingress

First, there is the technical problem of ingress or leakage into the cable system of radio and television signals being broadcast in the cable service area. Ingress plays much the same role in cable-based communications as "line noise" plays in telephone-based communications. Although coaxial cable is by its very nature resistant to the infiltration of external signals, a single poor connection or defective signal amplifier can cause whole sections of the network (perhaps miles in length) to act as a giant antenna, resulting in signal ingress.

The effects of ingress on video transmission range from mild image overlap to loss of synchronization (and consequent loss of video image). The effects of ingress on digital data transmissions are potentially more severe: Certain linkages can be rendered useless by the presence of overridingly strong external signals which "cover up" the data, resulting in massive numbers of transmission errors. For a digital system without complex and expensive error detection and correction

capabilities even an occasional error can be intolerable.

(ii) Maintenance

A second limitation related to the reliability of the system concerns the cable company's approach to the integrity of their network and its maintenance in the event of system malfunction or marginal performance. It must be borne in mind that Storer, or any other cable company, has as its major source of revenue the provision of entertainment programming to a mass market, the public at large. The reliability requirements of a network with this orientation differ markedly from those associated with a common-carrier network intended to provide data communications for business and institutional customers. If a pole-mounted signal amplifier needs to be replaced, a cable company will commonly interrupt service to a portion of the network for the 5 or 10 minutes necessary to perform the work. The reasoning is that the public will accept occasional interruptions in the middle of "Laverne and Shirley."

Such interruptions, however, are simply not acceptable for networks used for data communications by businesses or institutions. If the ICN is totally independent of the subscriber loop high reliability and availability can be built or managed into a system; but, as described earlier, the Storer system used portions of the subscriber loop (the A and AA cables) for ICN communications. There is little incentive, however, to establish a second, higher level of reliability for only a portion of their network; particularly one which does not provide revenue.

Although library experience with ICNs is virtually nonexistent, comments about the one existing installation described elsewhere tend to focus on complaints about reliability/maintenance issues rather than an advantages of the communications capabilities of the system. This factor must not be lost throughout the process of planning systems that may rely on the ICN for communications.

III. ICN CONSIDERATIONS

Because of its greater bandwidth and lower cost (free in this case), coaxial cable has advantages over the Public Switched Network (telephone and microwave for distribution of non-entertainment services. But, to understand the applications that are possible using institutional cable networks, it is necessary to also understand the strengths and weaknesses of telephone and microwave, the major alternative systems, and the direction these rivals seem to be taking, and the motivations of cable companies.

Industry observers, incidentally, speculate that the edge coaxial communications enjoy will exist for only the next 10 or 20 years. Widespread availability of broadband communications in the form of fiber optics and recent attempts by Bell to increase the capacity of the so-called "twisted pairs" of the telephone system suggest that broadband coaxial cable communications will be given a run for its money in the future.

A. Telephone Alternative

In the late 60's "time sharing" came of age using dial-up access through the telephone system to large, shared "mainframe" computers. Commercial time-sharing usually involved leased high speed lines with special conditioning provided at extra cost and with special technical arrangements by the phone company. Computer use changed during the 70's with the advent of the minicomputer, and more recently the microcomputer. Today, there is a growing trend for microcomputers, and even word processing equipment, to have communication capabilities. In essence, microcomputers have become "smart" terminals for a larger computer. As this trend continues the telephone network will have even greater demands placed upon it. The public switched telephone network, usually Bell operated, has been a traditional solution to local communications needs for the obvious reason of near universal accessibility. However, heavy data communication demands have now been placed on the phone system. Large numbers of low speed data communication users have emerged, bringing with them the potential for wholesale disruption of telephone traffic patterns.

Since the telephone company typically installs switching equipment based on 10 to 15 percent of telephones and being in use at a given time average call length of about 3 minutes, microcomputer to mainframe time-sharing with hour-long sessions (and not uncommon daily 8-hour business phone calls to commercial time-sharing services) have placed demands on the phone system

for greater switching capacity than otherwise might have been expected. Telephone company central offices or private branch exchanges, which still use older classes of switching equipment, are most susceptible to overloading. Heavy demands for telephone service have, in some cases, created situations where there simply is not room for more wires in conduits. Consequently, in some cities new telephone line installation requires weeks or months of lead-time.

B. Microwave

Increasing cost and decreasing availability of commercial telephone service has created the need for alternative local loop services. Local communications requirements generally fall into two categories: (1) fully switched low-bandwidth services, allowing arbitrary interconnection, and (2) dedicated high-speed circuits.

In the first category, it seems fairly clear that Bell and independent telephone companies will continue to meet this need. It is worth noting, though that at least one cable company has proposed voice and low-speed data communication (including an interconnect with MCI, a long distance alternative to Bell Long-Lines) as part of their franchise proposal. The latter requirement for high speed local data network needs will, it seems, be met by Bell competitors. Corporate-owned local area networks using coaxial cable will be feasible only when a fairly high number of corporate facilities are located in close proximity.

Microwave networks are fairly cost-effective, at least for common carrier applications, but have a number of weaknesses. For a consortium of libraries, or for all but the largest corporate user, the cost of erecting the microwave towers (and purchasing, operating, and maintaining the equipment) is by no means a trivial cost consideration. Another problem is spectrum congestion created by heavy utilization of the available microwave frequencies (although this may be alleviated by allocation of higher frequencies by the FCC). In metropolitan areas, line-of-sight transmission necessary for microwave can be a problem. Line-of-sight paths are not guaranteed by local or federal laws or ordinances. What this means, in practice, is that it's not uncommon to build a microwave network, and then have its use destroyed by the erection of a new building.

C. Broadband

In metropolitan areas, broadband communications provided via fiber optic or coaxial cable appears most attractive. Volume

production and installation of fiber optic technology, however, has not yet become a reality.

For all these reasons, in a number of metropolitan areas the unused bandwidth of a typical coaxial cable television operation has been scrutinized as an attractive source of low-cost communications. Older cable systems can be used for communication in the downstream direction without extensive reengineering and refitting of the cable plant. Typically, a low speed dial-up telephone link is proposed for the upstream portion of the network. Newer systems, such as Storer's, have the desired two-way capability engineered into the network at the outset (in this case through the B cable).

Although the word "cable" is invariably followed by the word "television," there is growing recognition on the part of both cable operators and business that the word "cable" should be followed by the word "communication." This change in view, however, presents a potential problem. Cable operators fear offering common carrier-type services (videotex, videoconferencing, electronic mail, computer-to-computer links) because of the possibility it will result in Federal Communication Commission regulation of the cable company as a common carrier. But FCC regulations over the last years have favored deregulation, suggesting this fear is largely unfounded.

Because the full range of audio, video, and data services have never really been provided by cable television networks in the past, some of the necessary hardware and software is not commercially available today. The hardware and software necessary have frequently been developed by a cable operator, on the premise that business service cashflow should offset the costs in fairly short order. Once the institutional loop is fully functional, the thinking goes, it would be easy and inexpensive to add any number of business, home transaction, and/or "blue sky" options. In reality, most two-way communications efforts to date have been proposed but not implemented, conducted only as demonstrations, or simply used as a marketing device.

D. Motivations

Low cost and high capacity suggest that institutional cable network applications are feasible, but most ICN applications seem to be more conceptual than actual. One reason for this is that cable operators, by and large, have come into the industry from the world of television. As such, they see their physical plant as a "black box" that mixes broadcast signals onto a coaxial cable. Another reason for slow implementation is strictly a

financial consideration; institutional loops have generally been provided as a free resource to the community. It really isn't in the operators' interest to spend a lot of time and effort supporting the service. Finally, there is the possibility of common carrier classification of the cable system. Although this seems unlikely, it could occur through Congress passing legislation, through rule-making by the FCC, or through the courts. As mentioned earlier in this report, this seems unlikely based on the FCC's record, but some State Public Utility Commissions have begun efforts to put cable data services into common carrier status.

E. Current Environment

With practically every cable franchise being awarded today, the recipient is required to install an institutional cable network. For example, in Pittsburgh, Warner-Amex has proposed an 80 channel subscriber system with an additional 51 institutional channels including a fiber optic link between some businesses for data transmission. In Dallas, Warner-Amex is installing a dual-cable system with the capacity of 100 subscriber channels plus an institutional loop of 52 channels. Mile High Cablevision was awarded the cable rights to Denver's 24,000 homes in March 1982, in part based on a 400 mile institutional loop. Teleprompter was awarded the 22,000 home franchise for Skokie, Illinois, a Chicago suburb. It plans 112 consumer channels, plus a 54 channel institutional network and a 6 channel no-fee service for senior citizens. Continental Cablevision was awarded the 35,000 home cable franchise for Brockton, Massachusetts. Continental will spend $9,000,000 to build a 70 channel residential and 104 channel institutional system. In mid-1981 Roger's Cable Systems and Trivion County Cable formed a joint venture to seek the cable franchise for Montgomery County, Maryland. Their "state-of-the-art" proposal included the use of Telidon (a Canadian videotex system) and an institutional network and data facilities for county businesses. Sammons Communications included in their Fort Worth, Texas, proposal an institutional loop to connect the city's municipal and educational buildings. In New Orleans, Cox Cable proposed a 1,455-mile subscriber system and a 201-mile data-only institutional network for government agencies, hospitals, and schools. The Cox system would also be available for leasing on a commercial basis.

(1) Iowa City Public Library

With all the emphasis on institutional loops, numerous applications using the broadband communications link would be expected. Perhaps the most widely recognized library

activity is the project at Iowa City Public Library involving the use of a microcomputer and an institutional loop. The status of that project, however, is typical of library, institutional, and commercial ICN applications. In spite of wide publicity by Library Journal and LITA, discussions with library director Lolly Eggers indicates that the project has never really gotten off the ground. They are waiting for software from CLSI, but the cable connection has not been established pending solution to the software problems.

(2) Public Library of Columbus and Franklin County

One of the few libraries in the country to have made actual use of an institutional network provided by a cable company is the Public Library of Columbus and Franklin County (PLCFC) in Columbus, Ohio. PLCFC has a Gaylord centralized circulation control system which communicates with circulation terminals in the various branch locations via dedicated telephone lines. On an experimental basis, the dedicated telephone link between the central computer at the Library Administrative Office and the Livingston Branch about 1½ miles away was replaced by an ICN link provided by Coaxial Communications Company.

Nick Miller, PLCFC Director of Data Processing, reports some difficulty was encountered with the actual conversion of the datalink from phone line to cable, mostly because the circulation system software had to be modified so it could handle the alternative communications path. The ICN link has been operational since October 1982, although provision was made for the original dedicated phone line to remain in place, if problems were encountered with the ICN link.

In point of fact, some problems have been encountered. Occasional data losses (on the order of one per day) are attributed to the ICN by circulation staff; others, however, point out that data integrity problems were encountered with the telephone-based communications system as well. The greatest problem seems to be related to the polling algorithm used by the Gaylord host computer, which drastically increased response time. Again, the significance of non-ICN issues in system considerations is highlighted. On the psychological side, there appeared to be some tendency for library staff to blame the ICN connection for a variety of unrelated problems. As of mid-December, the Livingston Branch was using the telephone for communication, and the ICN link was not in use.

(3) Private-Sector

In the business community, virtually all active broadband cable communication networks have been installed by private companies as local area networks. In the private sector, the installation of a broadband coaxial network provides a local distribution alternative for an end user with substantial communication needs. Many installations of this type are presently online in banks, insurance companies, and manufacturing installations. In downtown New York, for example, a coaxial network is operated by Manufacturers Hanover Trust Company. This network is designed not only to provide data communications for a wide range of applications using modems, but the system will soon be configured to provide distribution of voice channels from a regional microwave network to any of the buildings served by the network.

Cable operators consider commercial use of their institutional loops to be a source of revenue for the next decade, and there is growing business interest in broadband local area networks. On the other hand, the scarcity of community television-based ICN applications indicates that development of an ICN application would be a "state-of-the-art" effort.

IV. ALTERNATIVE APPLICATIONS

Free use of a sophisticated telecommunications system is a modern manager's dream. But the Storer ICN, like any communications link, is a means to an end; not an end in itself. There is a very real danger when working from the resource to the product, that a service with no market, with no user demand, or with no real benefit will be developed at great expense and effort. Similarly, there is the danger that a new development will fail, not because of the ICN, but because of the complexity of some other crucial system component. Nevertheless, availability of this potentially useful resource demands careful scrutiny of its possible application.

While developing this list of 17 alternative applications, the following objectives were kept uppermost:

- Match with library goals
- Long-term value to the library and patrons
- Feasibility or "do-ability"

To identify as many alternatives as possible, a taxonomy of potential ICN services was developed as illustrated in Table (1) At first, a two-dimensional design based only on the mode of transmission and the type of data to be transmitted seems simplistic. However, attempts to add additional dimensions of cost, system complexity, patron benefit, etc., showed that to deal with a multi-dimensional matrix was too difficult. The solution, it was felt, was to use "mode" and "form" as a means for identifying potential applications, to describe each application and its associated characteristics, and to use additional dimensions as part of evaluation criteria rather than part of the identification process.

The process then, was to identify as many potential communications needs as possible and assign them to appropriate locations in the alternative applications taxonomy matrix. To develop a comprehensive list of potential applications, studies of ICN applications for New York City, Cincinnati, Atlanta, and Columbus, Ohio were used. In addition, a proprietary Harnish Group information processing classification scheme was used. The method is based on certain characteristics of input, conversion, storage, transmission and output and has been used successfully on other projects to identify potential applications for unique technologies.

TABLE 1
Alternative Applications Taxonomy

MODE \ FORM	AUDIO	DIGITAL	VIDEO
1-WAY	1 Radio Relay 2 A/V ILL	3 Security 4 Energy Management 5 Teletext Relay 6 Library Usage Data Collection 7 Software ILL 8 Facsimile	9 Programming 10 Training 2 A/V ILL 3 Security
2-WAY	11 Telephone	12 Message Board 13 Computer Service Access 14 Electronic Mail 15 Videotex 16 Document Delivery 4 Energy Control 5 Teletext Database	17 Teleconferencing

Low ◄——— BANDWIDTH REQUIRED ———► High

Several applications (audio/visual ILL, energy monitoring and control, and teletext) occur in more than one location because different implementations of the concept use different ICN modes, or different forms of transmitted information.

Each application is identified by a unique number, its name and a description of the service. The primary advantages and disadvantages of the application are discussed, and equipment and staff costs for development and operations are estimated. The advantages and disadvantages of each application, and its estimated visibility or public relations value is described. Growth potential of the application is estimated based on current trends as a measure of the long-term potential of the application to serve library and patron needs. The degree of ICN resource consumption is indicated to assist in subsequent evaluation when more than one application might be considered for simultaneous implementation.

1. Radio Relay

(a) Description

In keeping with the library's role of providing access to material that might not otherwise be available to patrons, this application involves the creation of a central relay point for the purpose of receiving and distributing a variety of radio broadcasts. Cable companies frequently provide a similar service by inserting local and remote FM radio signals that can be split off at the consumers' premises. This application is distinguished by its focus on foreign and domestic shortwave broadcasts. Although the regulatory constraints are not clear, it could also be possible to also receive and redistribute VHF transmissions such as ground-to-air and air-to-air aviation radio traffic, and ham radio traffic. Technically, of course, fire and police broadcasts could also be included, but from the authors' point of view this seems inappropriate.

The received broadcasts would be merged onto the ICN for redistribution to other ICN locations or possibly onto the subscriber loop. In either case, the audio could be used as background for text pages or a news scroll. At the participating library locations a radio-listening area could be constructed inexpensively with several earphone headsets and radio channel selector switches. Typical broadcast sources for this service would include the Voice of America, Radio Moscow or Radio Havana, and specific radio stations in countries where events of international significance are taking place. Broadcasts in foreign languages could be scheduled for specific times for the benefit of foreign language students. Taped redistribution of significant programs could be provided. Over time, certain unique opportunities would exist such as with the launch of Sputnik I and early flights of the space shuttle.

(b) Considerations

Library patrons would be the specific beneficiaries of this service. The major advantages of the service would be access to otherwise difficult to obtain information through a scarce medium. While there would probably be those who would object, convenient access through the library to alternative views of world affairs seems particularly in keeping with the library role. A major disadvantage of the application is the need to create and operate the radio center. Several radio receivers would be required with

associated antenna, amplifiers, switches and so forth. In addition, a fairly high degree of technical knowledge would be required on the part of the operator(s). It seems highly likely, however, that members of local ham radio groups or the Amateur Radio Relay League (ARRL) would not only be interested in the service but would actively support it.

(c) Cost
The major initial cost for the application would be for the radios and associated equipment and room to house the equipment. Additionally, the radio listening areas would require chairs, a table with the necessary switches and earphones, and of course a reserved space. Operational expenses would be nil with the exception of possible maintenance on the equipment.

(d) Visibility
The public relations value of this application would appear to be high for the general public, the user community, and library profession. As a unique ICN and cable application, as well as an innovative library service, visibility would be broad.

(e) Future
Expanded hours of service, broader selection of broadcasts, creation of radio listening clubs, and involvement of social and educational language groups could be used to extend the service over time.

(f) Bandwidth
The narrow bandwidth requirements for low-fidelity audio makes it possible for a wide number of simultaneous signals to be transmitted using the ICN. Actually, this application could be used in conjunction with other low-bandwidth applications should a multi-application project be considered.

2. Audio/Visual Distribution

(a) Description

Point to point delivery of requested audio/visual materials including films, filmstrips, audio tapes, slides, and photographs would be possible with this application. One alternative implementation of this application would involve reproduction and recording equipment at both point of origination and destination. This method of distribution of audio/visual materials would supplant "bicycling" of commercially prepared copies. Of course, such a mechanism implies the possibility for creating multiple copies of commercial audio/visual materials and the associated royalty, copyright, and fair use problems. An alternative implementation of this concept would include "on-demand" distribution of the materials through the subscriber loop to library patrons and cable subscribers as described in Application 9, **Programming.**

(b) Considerations

Although some benefits would accrue to library administration, and possibly to individual libraries, the patron would be the primary beneficiary of the service. The major advantage would be convenient access to library audio/visual materials. Developing a larger library of materials would be possible because investment would not be required in multiple copies, and because a wider variety of items could be obtained. The disadvantages of the application include possible reduction of resolution, fidelity, or general quality. (For example, note the relatively poor television reproduction of an otherwise high-resolution photograph.) As in other applications, problems may arise from copyright or fair use laws. What is more, while high fidelity reproduction of audio tapes or records might be possible, liner notes and associated text materials would be difficult to provide.

(c) Cost

Primary costs involved in establishing this alternative would be for projectors, video modulators, kinescopes, and tape player (both video and audio). The operational costs of this service would include salary for an operator.

(d) Visibility

The general public would probably find this a moderately interesting application, while the user community -- who would have the opportunity to receive real benefit from it -- would, no doubt, be more interested. As a unique application of the ICN, and one that particularly addresses the issue of circulation of otherwise difficult to handle audio/visual materials, this application should receive considerable interest from the library profession.

(e) Future

Future growth opportunities are difficult to specify, but appear significant based on the development of the Sony Mavica camera, which stores images on a magnetic disk rather than on film. This technology has been developed with an eye toward reproduction of the photographs using the television as a display device. Distribution of these images via the ICN would certainly be possible.

(f) Bandwidth

Depending upon the level at which this application is implemented, it would consume a minimum of one audio link (for the distribution of low-fidelity audio) to one full video channel (for the distribution of videotapes or kinescopically reproduced movies).

3. **Security**

(a) Description

Through the use of the ICN, video or sensor-based monitoring of branch libraries at a central point could be accomplished. Surveillance cameras and security systems including intrusion alarms, motion detectors, or fire and smoke alarms could be included in such an application.

(b) Considerations

Although some benefit could accrue to the patron in high crime areas, the primary beneficiary would be library administration. The principle advantage of this application would be reduced security staff costs, and reduced risks of perpetrated or accidental damage to facilities. The two major disadvantages of the application are the high cost for the sensors (cameras and monitoring devices), and the possibility that there would be no guards on the premises for other security functions.

(c) Cost

Initial cost would include not only cameras and detectors, as mentioned earlier, but also monitoring panels, switches, multiplexers and a central security console. During operation there would be a requirement for a person to monitor the security console.

(d) Visibility

This application would have minor public relations value both to the general public, the user community patrons, and the library profession. It has a certain "high tech" sense to it, but it is not really clear whether the increased security would justify the cost.

(e) Future

Future growth opportunities would include addition of sensors, and the possibility of direct links to fire and police.

(f) Bandwidth

One switched video channel or multiple data subchannels would be required to support this applications.

4. Energy Management and Monitoring

(a) Description

This application would involve remote monitoring and control of environmental conditions and associated equipment to reduce energy consumption. Humidity, temperature, and lighting could be controlled by a central processor and associated remote monitoring devices.

(b) Considerations

While there might be some benefit to the patron and increased protection of library materials through improved environmental conditions, the primary beneficiary would be library administration. The major advantage of this ICN application would be the potential for reduced energy costs. While there is the danger of critical link risks (all your eggs in one environmental control basket), the major disadvantage of the application would be relatively high capital costs for equipment.

(c) Cost

Although 1 to 3 year pay-back of capital investment is typical for these systems, the initial cost of local sensors, wiring control devices, and central environmental control equipment could range from ten thousand to one hundred thousand dollars per installation. Because of the relatively high variable cost of the sensors and control devices, cost per user does not decrease appreciably as the number of users increases. During operation the system would basically work unattended, but would require assignment of individuals accountable for maintenance, repair, and operation of the system.

(d) Visibility

The public relations value of this application would be low with respect to the general public and patron, and would be moderate with respect to the library profession.

(e) Future

The growth opportunity for this application seems limited unless the cooperation of non-library institutions could be obtained. The concept of the library as a city or regional environmental control center seems to stretch library goals rather far, however.

(f) Bandwidth

One digital link per remote site would be required for this application.

5. Teletext Relay and Database

(a) Description

This application involves the acquisition and redistribution of teletext signals from diverse sources. As one of the emerging information technologies, teletext, offers "hot" news, weather, sports, community information, and other newspaper-like information using text and graphics displayed on a TV screen. The TOCOM 55+ teletext service proposed by Storer is typical of the kind of teletext service that could be provided.

(b) Considerations

The primary beneficiary of the service would be patrons, with the major advantage that they would have access to remote sources of this new medium which might not otherwise be available to them. An additional advantage would be decreased equipment costs resulting from a central acquisition site. The major, and perhaps overriding, disadvantages or constraints include the relative lack of teletext services available today and the requirement for users to have a teletext decoder. The decoder extricates the teletext signal from a standard broadcast or cablecast channel's vertical blanking interval. Many Storer customers may be expected to have decoders once the TOCOM 55+ system is implemented, however. Further, a growing number of sources of teletext materials are being created. While the timeliness of the information provided through teletext could be considered a major advantage of such services, the regional or local nature of remotely originated teletext information could be considered a disadvantage except when viewed in the same context as the library's collection of out-of-town phone books.

(c) Cost

The initial cost of this alternative will include the cost of decoders if distribution is limited to unequipped library television sets (although Storer subscribers may have the capability of decoding teletext as part of their cable equipment). In addition, distribution equipment and modulators will be required. Probably the major expense during the initial phases of this application would be the development and implementation of the central site equipment used to acquire the remote teletext signals. Unlike the exten-

sive resources necessary for those that create and originate teletext, this service would be largely an unattended operation except for maintenance.

(d) Visibility

As an idea that, as far as we know, has never been considered before, the public relations value should be fairly high. The value of the application to the general public would be negligible, but for the Storer user community and patrons in particular, it appears that this application would create considerable interest. Among the library profession, the uniqueness of the concept and the electronic parallel to other library services could make it quite attractive.

(e) Future

Growth opportunities for this application include addition of more teletext services as they become available. Although arguably not a part of this application, the possibility of creating a viewdata-like database of teletext screens from multiple systems would result in a truly unique service offering the immediacy of teletext and the retrieval structures of viewdata.

(f) Bandwidth

This application would require one data link per user. The major constraint of the system would not be the ICN but the capacity of the supporting computer system.

6. Library Usage Data Collection

(a) Description

Because of continuing interest on the part of libraries to measure library performance, the possibility of using the ICN as a communications link to transmit patron traffic information to a central collection point seems attractive. Simple electronic eye sensors to measure traffic through doorways or turnstyles or could collect data which would then be transmitted to a low-cost microcomputer at a central point for storage and processing. More sophisticated devices might add time-of-day information each time the sensor is interrupted to allow not only analysis of traffic frequency, but also patterns of use. Sensors could be moved throughout individual buildings to permit analysis of total library traffic as well as traffic through certain portions of the library. Switch-activated sensors could also be used to record special activities.

(b) Considerations

Library administration would be the primary beneficiary of the service as it would provide one way of measuring what it is libraries do, so that they can do it better. The primary constraint on such an application would be design and installation of the sensors, library wiring, and distribution panels. Of course, there is also the question of whether patron traffic, in itself, is worth measuring at other than infrequent intervals for the purposes of patron flow studies.

(c) Cost

Initial developmental costs for this project would be fairly extensive primarily for the central data collection facilities and the remote sensors. Operational costs for the system would be minimal, primarily associated with operation of the central site. If the system could be connected with an existing data processing facility the operation costs, with the exception of possible maintenance requirements, would approach insignificance.

(d) Visibility

Library staff and library administration would be the primary beneficiaries of this application, and the general public would probably have little, if any, interest in it.

(e) Future

The only obvious opportunity to expand the service would be through the addition of sensors, or increased sophistication of the data manipulation and reporting software.

(f) Bandwidth

One subchannel would be required for each reporting site (not each sensor -- each sensor output could be multiplexed into one data channel), and thus would require a fairly low commitment of the ICN resource. This application might well be combined with other applications that place low demand on the bandwidth of the ICN.

7. Software Distribution

(a) Description

Perhaps this application is most easily conceived as software interlibrary loan. This software could be public domain software that was developed in-house, or commercial software distributed for a fee with royalties paid to the author or broker.

(b) Considerations

Depending on the nature of the software, the primary beneficiary could be the patron, the library staff or the library administration. The major advantage of the application stems from the increased accessibility to the library's software collection. If the concept of the library even having a "software collection" seems unusual, it is the authors' opinion that there is no practical difference between, for example, a book which describes a method for calculating depreciation of an asset and a computer program which actually does the calculation. Philosophically, however, this is recognized as a substantial departure from the current viewof appropriate library functions. On the other hand, if the software in question were limited to in-house programs and utilities used as part of the library operation (e.g., in support of a microcomputer patron service or library administrative processes) the library's involvement would be more obviously appropriate.

(c) Cost

The initial costs of this application would be those associated with the necessary computers (one for each site), software, and the modems and multiplexers necessary to support the network. During operation of this system, the primary costs would be those associated with the computer operators and with the maintenance and repair of the equipment.

(d) Visibility

As far as the public is concerned, this application would probably have very little public relations value. Among one segment of the user community, the microcomputer owners,

there would be considerable interest. As a unique application of the institutional loop, the library profession should be very interested.

(e) Future

Growth opportunities for this application, if the basic premise of the library as a source for software is accepted, is extensive. A national electronic library network used to distribute software could be a possibility. As any new medium offers advantages and disadvantages, as well as new ways of doing things, the library could well find a role collecting, organizing, and disseminating microcomputer programs contributed by patrons or purchased in the same manner as books. With approximately two million microcomputers in homes and businesses today, and with forecasts for that number to increase 20-fold in the next 5 years, it seems inevitable that someone is going to have to meet this need.

(f) Bandwidth

The resources required for this application consist of one point-to-point data communications link connected to the central library software collection for each user. The amount of resource consumed by that link depends on the speed of the data transmission, but even with the fastest commonly used speeds, over 300 simultaneous links could be provided per ICN channel.

8. Sub-Minute Facsimile

(a) Description

Using the ICN, transmission of documents or portions of documents using what amount to communicating copy machines is possible. This service, with far more capability and sophistication than ordinary facsimile, could make it possible for one library to transmit pages of a book or a copy of an article rapidly from one library to another. Similarly, library staff and administration could take advantage of the high-speed communications link to send interoffice memos, instructions, letters, and similar correspondence.

(b) Considerations

The primary beneficiary of these services could be patrons, library staff, or library administration depending on the nature of the documents transmitted. The major advantage of the service would be better access to materials for patrons, and quicker distribution of library administrative documents. By designating certain libraries as centralized repositories of certain types of materials, duplication could be reduced, and the savings used both to pay for the cost of the system and to acquire additional materials. The major disadvantage of the system is the high cost of the communicating copy machines. Another disadvantage of this application is the difficulty in transmitting whole documents, particularly those that are bound. A real question that must be asked is whether or not enough patrons really need hard-copy information so quickly that this application makes sense. Technically, a potential disadvantage is the need for compatibility among all of the terminal equipment.

(c) Cost

The major initial cost of the system would be involved in the equipment itself and the associated data communications modems and multiplexers. Communicating copy machines equipped to work at the speeds possible on the ICN cost in the six to eight thousand dollar range each. The operational costs of the system involve consumables and maintenance. Staff costs could be high if the service is offered as a demand-delivery product. With the prospect of receiving a several page document electronically in under 5 minutes, the implication is that a patron arriving at a library could expect to wait for a librarian at another library to find the document and send it through the system. Staff support

for this kind of a service would necessarily be extensive to justify the investment in the equipment. It makes little sense to require, say, a half a day wait to locate an item, and then transmit it in seconds to a site less than 25 miles away. It seems likely that an efficiently run vehicular distribution system could provide as good a service in about the same time at considerably less cost.

(d) Visibility

Assuming that the staff support could be justified, that copyright issues could be resolved, and that the expense of the system was acceptable, the general public (particularly the business and academic markets) might find the service particularly intriguing if a library branch styled after "Fotomat" were to be developed around such a high speed communicating copier. Heavy library users, particularly in the academic community, would no doubt find this service particularly attractive. It would also be highly visible among the library profession.

(e) Future

In terms of growth opportunities, the addition of more terminals (communicating copy machines) is a natural path. Particularly intriguing is the possibility of several technologies coming together in support of this application. The general concept of document delivery (application #16), highly detailed online catalogs of monograph and periodical materials, and library data services combine to create interesting possibilities for the library of the future.

(f) Bandwidth

Bandwidth requirements for this application would vary with the speed of transmission, but many simultaneous users could be supported using subchannel allocations.

9. Programming

(a) Description

The most traditional of the proposed alternative applications is the provision of locally-originated live programming or commercially available movies and videotapes. Such programming would be cablecast for viewing by library patrons, viewers at other libraries, or by Storer customers through the subscriber loop. As with the other applications, the degree of involvement in each of the applications can range from a very low-level effort to a highly intensive and complex project involving the entire library system. At the lowest level, a single videocassette recorder and a collection of cassettes could be used to provide a reasonable service. An aggressive service would position the library as a source of programming, virtually a television station in its own right. An interesting possibility for recovering some of the cost of operation of this local service would be the creation of a "library superstation" which would redistribute its programming via satellite to other cable systems. "Fee versus free" issues, copyright, library purpose -- the specter of a library service supported by paid advertising raises more questions than answers.

(b) Considerations

The patron, as primary beneficiary of the new service, would have the advantage of more convenient access to library and community events. In general, then, this application offers access to library materials to more patrons at a lower per-unit cost. There appear to be two disadvantages to this application. First, the purchase of projection-type TV's may be necessary to enable more than a few patrons to view the programming at one time. Secondly, if the programs are to be distributed over the subscriber loop, legal issues regarding ownership rights and redistribution of audio/visual materials may come into play.

(c) Cost

Initial or developmental costs of this applications will involve a videocassette recorder or kinescope at the originating point. Receiving institutions will be required to have video interfaces and standard or large-screen television sets. During operation of the service at least one staff member would have to be assigned to operate and monitor the equipment during showings.

(d) Visibility

From a public relations standpoint, if the programming offered is more than "just" public access programming and includes educational and entertainment movies and videotapes, the general public and the user community in particular should find it very attractive. Although a reasonably traditional library/cable application, if one or more of the innovative approaches were taken, the visibility of the programs to the library profession would be extremely high.

(e) Future

Growth opportunity for this application includes expansion from part-time to full-time cablecasting of programming, and the addition of remote coverage of cultural events.

(f) Bandwidth

This application will require one full video channel, and would consume all of the ICN bandwidth allocated to the library during the time the service was operated.

10. Training

(a) Description

This application would involve cablecasting training films or tapes of general interest (management, library science) or specific interest (policies and procedures of a particular library system) for use by all units of a library system. The prospect of including continuing education programs and specific training programs as part of this application seems promising, with the caveat that legal issues could be involved from a copyright or redistribution standpoint. Whether the library could in fact find continuing education materials that weren't already provided by educational institutions, of course, remains to be seen.

(b) Considerations

The primary beneficiary of the service would be the library staff, with the principal advantages being that no transportation of the materials would be required and each remote library would not require videocassette equipment. The disadvantage of the application is that no human contact or hands-on experience will be possible. In addition, much of the training materials that exist today are not in audio/visual form and thus are not amenable to this means of distribution.

(c) Cost

The initial costs for this application include a videocassette recorder for the central site, video modulators for the central site and remote origination points, and TV's for viewing locations. A potentially large cost for this application would be the actual production of training programs, if required. Acquisition of pre-recorded materials can range from free, for public domain materials or those generally approved for "in-house use only," to several hundred dollars for special training programs, and can run as much as several thousand dollars for some types of technical and management training programs. During operation, at least one staff member will be required to run the equipment at the central site. Administrative tasks associated with this alternative presumably would be handled by those already responsible for training.

(d) Visibility

There appears to be little, if any, public relations value as far as the general public or user community are concerned, however it could be fairly high as far as the library profession is concerned.

(e) Future

This application could grow by addition of training sessions and cooperation with educational institutions with the library serving as a "gateway" or distribution point.

(f) Bandwidth

As this application requires one full video channel, the entire capacity of the ICN will have to be devoted to this application.

11. Telephone

(a) Description

Because of the low bandwidth requirement of voice grade telephone communications, approximately two thousand simultaneous phone conversations can be transmitted through the ICN. Since the ICN is provided to the libraries as a free resource, the possibility for a significant reduction in telephone communication costs is suggested. Telephone communications with any of the ICN participants would be simply a matter of dialing a special access number and the appropriate ICN telephone number. As an alternative special telephones could also be connected to the ICN (in a manner equivalent to a party line) without going through existing telephone equipment.

(b) Considerations

The primary beneficiary of this service would be library administration and staff, since it is doubtful that patrons would have a use for a telephone system that would only allow them to only call another library or ICN location. The major advantage of the service is derived from the potential decrease in telephone costs incurred by the libraries on a monthly basis. However, when viewed from a total system standpoint, the net cost savings may not be as great as it first appears. For the system to be truly useful, a significant amount of equipment unrelated to the ICN *per se* would be required. For example, the PBX or PABX that handles the phone switching within individual libraries is undoubtedly not capable of accepting a broadband communications link without modification. Thus, the expense of an interface, or alternative routing schemes which bypass the PBX or PABX altogether, would be required. As in other potential ICN applications, on the surface the application seems particularly attractive, but the major problems with implementing the concept have to do with necessary technical, managerial, or administrative infrastructures that must be created beyond the ICN itself.

(c) Cost

The initial cost of the system would be the primary barrier to implementation. The interfaces to the branch exchange and ICN represent the major portion of early costs. In addition, system design and associated consulting would be required. Operational costs, on the other hand, would be

low once the system was installed. The system would require little staff attention, and maintenance on this type of equipment is typically quite low.

(d) Visibility

As a library technical or administrative service, the visibility to the general public and user community would be low. Among library professionals, however, there would be considerable interest if the application was successfully implemented.

(e) Future

In addition to expanding the scope of the service to other institutional network locations, or the addition of additional telephones within existing libraries, a direct connection from this system to a low-cost long distance service would be possibile. Most cable companies today are investigating this possibility in one way or another, and such a capability could be developed without the involvement of the local telephone company.

(f) Bandwidth

If this application were implemented, each individual voice link would require a narrow subchannel with an assigned ICN channel. However, if the entire ICN channel is dedicated to telephone use, other applications would be excluded because of its bandwidth requirements. It would be possible to implement this application using only a few subchannels, leaving room for other low-bandwidth applications described elsewhere.

12. Message Board

(a) Description

This application is most easily seen as an electronic corollary to a bulletin board on which 3x5 cards offering services, messages, or items for sale could be posted. The advantage of the electronic version would be a keyword search capability. Thus, a patron looking for babysitting services in a particular area could enter "babysitting" and "Newport" as keywords to view a list of names and phone numbers that were entered by patrons offering such a service. In addition, the library could use parts of this system to "advertise" new services, upcoming events, and so forth.

(b) Considerations

Provided primarily as a new medium for the exchange of information between patrons, this application would accrue benefit primarily to the patron, although some library staff and administration benefit would be achieved. The primary advantage of this service would be ease of use due to the keyword capability. On the other hand, one of the primary disadvantages of the service would be the requirement for users/patrons to understand the use of the terminal connected to the ICN which is used to enter and retrieve information from the system. The major disadvantage of the service is the requirement for a host microcomputer and associated software. No complex development would be required because numerous bulletin board systems exist for microcomputers. However, the acquisition, installation, and implementation of the service -- particularly the ICN interconnection -- would not be a trivial task. Another serious constraint on the feasibility of this application involves editorial control. Although in principle it should be no more a problem with an electronic version than there would be with the hypothetical 3x5 card version, it seems highly likely the system would be used for inappropriate messages. Although this problem could potentially be solved by requiring new messages to go into a "holding area" for review by library staff for release, the assignment of library resources to this task may be inappropriate.

(c) Cost

The initial costs involved in this application would be largely based on the cost of the required microcomputer,

software, and terminals. In relative terms the ten to fifteen thousand dollars required for the host system and, say, ten terminals does not seem exorbitant; the expense problems associated with implementing the system compared to its perceived utility may not balance. The cost of operating the system would be minimal, although some staff resources would be required to monitor use of the individual terminals and operation of the host. Of course, if editorial resources were assigned to review content, as suggested earlier, a significant resource requirement could exist if use of the system was heavy.

(d) Visibility

If a rugged terminal could be placed in public locations such as a shopping center, the visibility of the service to the public could be great. Within the library user community, there would likely be considerable initial interest in the concept; however, the long-term value or need for such a service would have to be demonstrated. Visibility of this application to the library profession would appear to be high.

(e) Future

The primary avenue for growth, would be with the addition of public access and in-library terminals, would be through expansion of the memory capacity of the system (predicated upon user demand).

(f) Bandwidth

The low speed data transmission requirements of this application would require the assignment of only one narrow subchannel per terminal. As with other low speed data applications, implementation of this alternative would permit the use of the ICN for other low speed data or voice applications.

13. Computer Service Access

(a) Description

One of the most attractive ICN applications, at a conceptual level, is the use of the ICN to provide remote access to computer services. Assuming that a high level of reliability and signal quality could be insured, there is little doubt of the potential of the ICN for this application. Use of the ICN to provide remote access to an online union catalog, regional databases of locally pertinent data, a centralized circulation control system, administrative data processing services, or a gateway to national information services would all be possible through this application.

(b) Considerations

The primary beneficiary of this service would be library staff or administration, although it is conceivable that patron access to an online catalog or some remote computer services could be possible.

As with other applications, the primary advantage to using the ICN for computer service access is the potential low cost and high speed data transmission possible through the network. We must again note that the apparent advantages of the ICN may overshadow the inherent problems involved in the creation of a sophisticated computer system network architecture which includes the ICN. At the risk of belaboring the point stated elsewhere, to develop, for example, a centralized circulation control system or an online union catalog which is accessed through the ICN, would involve far more problems, expense, and issues at the level of the host system than those involved in the ICN itself. As a solution looking for a problem, the ICN offers the opportunity for some expensive mistakes to be made easily.

From a systems development point of view, the pivotal issue is identifying the problem(s) to be solved. Once the problems have been rigorously defined, then the decisions necessary to solve those problems can be determined. Once the decisions have been defined, then the information necessary to make those decisions to solve those problems can be identified. But the process isn't finished yet. Only after the information requirements have been identified can the information systems necessary to provide that information be specified. Then, and only then, can the necessary communications requirements be determined. This is not to say that

when a free communications service exists, that it wouldn't be factored into the overall design of the system from the outside. For all the potential ICN applications that are associated with computer service access, the solution is to approach the problem from the level of the overall objective, and then factor in the potential of the ICN.

(c) Cost

Specifying initial or developmental costs for use of the ICN to access computer services without a clear understanding of the specific services is extremely difficult. It certainly can be assumed that the cable will have to be extended from the local drop to the computer or terminal. Also, modems will be required at each end of the cable and any multiplexers or demultiplexers that might be required to handle several devices using one subchannel. The operational costs involved in the project will depend almost entirely on the particular computer service access application chosen. In this type of application the operational expenses associated with the ICN should be negligible.

(d) Visibility

As with the other factors associated with this application, visibility of the effort will be primarily related to the host implementation. A regional circulation control system, for example, will be unique enough in its own right, and will attract major attention. There is no doubt, however, that such an application that also includes communications through the ICN will be that much more spectacular. The problems and solutions of the ICN implementation would certainly be the source of library, communications, and computer journals. From a public standpoint, visibility would be reasonably low for those ICN applications of computer access for library technical services. However, the general public, the library user community, and the library profession in general would undoubtedly be very interested in an online union catalog for the three-county area.

(e) Growth

For an ICN which is a stable, reliable communications link the growth opportunities in the area of computer access are considerable. But, as throughout this report, the caveat of quality and reliability remains crucial.

(f) Bandwidth

For large-scale data processing systems such as an online union catalog, centralized circulation control system, or certain administrative data processing applications, the bandwidth required for other than low speed terminals can be extensive. Without an understanding of the specific application it is difficult to specify exact bandwidth requirements, but it is safe to assume that a full channel could be required.

14. Electronic Mail

(a) Description

Independent of a large mainframe computer, the installation of a microcomputer with appropriate software could make possible the establishment of an electronic mail network using the ICN. Most microcomputer-based electronic mail systems provide the capability for a user to send and receive mail in a private "mailbox." Messages are entered through a terminal keyboard and read off of either a screen or low speed printer. Most microcomputer electronic mail systems also include a simple text editor with an adequate, but not sophisticated, capability. With the advent of full-function computer terminals for a price less than $500 in quantities of 100 or more, and microcomputers with software adequate to handle this application for well under $10,000, the possibility for developing a useful electronic mail system becomes feasible. With such a system, besides individual and administrative communications, the development of an efficient interlibrary loan system becomes possible.

(b) Considerations

The major advantage of an electronic mail system is more convenient access to text communications. Because the messages can be stored for later retrieval (in some cases by keyword), and because the systems generally include word processing capability, staff can become more efficient in interoffice communication. In some cases the systems may also be configured for remote access, so that even if someone is out of town, they can still have access to their office mail. The major disadvantage of the system is that it requires acquisition of hardware and software to support it including the terminals, with a total price for a 100 terminal system rounding to between seventy-five thousand and one hundred thousand dollars. As with other applications, the issue of signal quality and reliability of the ICN comes to the fore. Another consideration, not to be dismissed lightly, is the problem of doing business a different way. In much the same way that learning to dictate is an acquired skill, it requires practice, and certain accommodation in office procedures, while electronic mail offers certain advantages it also requires practice for ease of use, and integration into one's work style.

(c) Cost

The operations cost for the system would be limited to maintenance, and the devotion of some part of a person's time to be sure that the system was operating properly.

(d) Visibility

Other than for its novelty value, the general public would probably have little interest in this application. The primary benefit of the application would be for the library staff and administration, and the ICN connection would no doubt be of great interest to the library profession.

(e) Future

Growth for this application would involve the addition of more terminals, more sophisticated hardware and software, and an evolution into an integrated system with other information retrieval and automation services.

(f) Bandwidth

As a low-speed digital application, assignment of subchannels equal to the number of terminals will be required. Only a small portion of the allocated ICN channel will be required, leaving room for other low bandwidth applications, if desired.

15. Videotex

(a) Description

A new technology which displays text and graphics on a special terminal or TV screen is being developed by companies, government agencies, and institutions worldwide. It is designed specifically for ease of use, low cost, and to provide access to a wide variety of information. Most videotex applications that have been proposed or tested to date have generally been for public access. In Europe however, several in-house videotex applications have been implemented, notably in Germany. An in-house library application, including the potential for public access through the two-way capabilities of the Storer system could include an online catalog, reference information such as encyclopedias, almanacs, and other information of general interest. An often overlooked, but highly attractive, use for videotex is for strictly local data. Databases of local entertainment and cultural activities, library services, and community information referral sources as well as local government and political information could be provided. Because of the comprehensiveness of the videotex service, this application comes the closest to becoming an electronic corollary to existing library services.

(b) Considerations

The major advantage of this system is convenient access for patrons to a wide variety of information. A significant disadvantage, as with many other of the applications, is that development of the service which the ICN will support will be more involving a problem than the application of the ICN itself. As an emerging technology, videotex has not been fully developed. Although there is considerable activity in the United States, Canada and Europe, the availability of inexpensive terminals, and tested hardware and software is poor.

Although the system could be configured to be primarily a benefit to the patron, the ability to form "closed user groups" within the system could make it possible for the participating libraries to simultaneously benefit through the inclusion of such things as meeting schedules, library news, and other information of particular interest to the staff and administration of the participating libraries. As with other applications, the quality and reliability of the ICN would be essential. However, if any of these applica-

tions was to particularly attract the attention of the cable company and provide them with motivation to insure top quality service, this would probably be the one. Although intense activity is going on within the cable industry to mount thorough interactive services (rather than simple viewer polling) the lack of any clear indication of customer demand has tempered development. In the opinion of the authors, the opportunity for Storer to participate in a joint venture to develop a videotex service for library patrons that could also serve as a testbed for future developments would have to be attractive to them.

(c) Cost

By no means an inexpensive application to develop or operate, it seems distinctly possible that industry cooperation could be achieved. The primary costs involved in the initial stages would involve design and development of the system architecture, purchase of the host computer and videotex software, and acquisition of databases. Although many of the databases could be acquired in machine-readable form, there is little doubt that the vast majority of the material would have to be converted for videotex use. In many cases this could mean the expense of software development and data processing. During operation of the system, besides supporting a reasonably sophisticated data processing operation, entry of new data and management of editorial content would require the full time of several staff members. Again, the possibility of industry cooperation in such a venture seems likely.

(d) Visibility

With the growing interest on the part of the general public in electronic games and personal computers, the availability of a videotex service in a library would undoubtedly attract both public and user community attention. Because videotex appears to be developing as a new medium of information dissemination, interest among library professionals has been extensive over the last 3 to 4 years. The combination of the videotex technology with ICN technology would certainly have high visibility.

(e) Future

There is little doubt that the opportunities for growth in videotex will be great. As major telecommunications conglomerates, entertainment companies, computer firms, and

publishers invest in videotex, additional information resources and distribution opportunities will be created. The obvious opportunity for a direct tie between circulation systems, online union catalogs, videotex, and other electronic information media provide a significant opportunity for libraries in the future.

(f) Bandwidth

Although most videotex applications today are limited to 1200 baud (120 characters per second) transmission, and thereforehave relatively low bandwidth requirements, the capability of the cable system to transmit videotex text and graphics at a much higher rate makes the ICN particularly attractive. To achieve these higher data rates, however, a significant portion of an allocated channel could be required.

16. Document Delivery

(a) Description

The most futuristic of the listed applications, document delivery, involves electronic storage and delivery of full text of documents. Current research underway by OCLC and others is directed towards achieving the electronic ability to reproduce the format and quality of printed text on a cathode ray tube. Publication of electronic journals, and retrieval of the full text of articles or just one paragraph will be made possible by document delivery technology.

(b) Considerations

While this technology will utlimately have benefit for both library staff and administration, library patrons will benefit from the opportunity to retrieve documents directly with an "electronic visit" to the library. The biggest advantage of these systems will be convenience, particularly for researchers, authors, and academicians. It appears likely that library patrons will find the ability to retrieve just page 33 of Newsweek, after a brief search in the "electronic Readers Guide," appealing. An overriding disadvantage of this application is the technology simply does not exist yet. There are relatively few documents in machine-readable form, and no databases which include the necessary typesetting information to reproduce them in anything like printed form.

(c) Costs

Although the cost of the technology necessary to make this kind of an application feasible is decreasing rapidly, cost and availability will be an impediment to its diffusion in the short-term.

(d) Visibility

As a futuristic application it is hard to predict exactly how the public, library user community, and library profession will react to the concept of document delivery. Research efforts at OCLC, however, have been well received within the library community and of great interest by publishers.

(e) Future

To speculate on the future of a futuristic application might well be an exercise in science fiction. In any case, the authors of this report have both long held that the day will come when a fully functional terminal about the size of an encyclopedia volume will exist with wireless communications capability. This portable terminal, with a flat screen and high definition black-and-white display, would permit retrieval of text in a form indistinguishable from ink on paper. By the time such technology is available, a large number of online databases should be available to make this device, called Everybook•, into the equivalent of every book.

(f) Bandwidth

Because of the high data rates necessary to transmit the high quality images of document delivery systems, significant bandwidths will be required. As in the case of videotex and computer service access, the broad bandwidth of the institutional cable network makes it particularly attractive for this application.

• The Harnish Group, 1982

17. Teleconferencing

(a) Description

Using the bandwidth available through the ICN, audio and visual two-way communications is possible to support or replace meetings and gatherings. Generally limited to facilities equipped to conduct teleconferences, this application makes it possible for management and staff of organizations and firms to meet although separated by geography.

(b) Considerations

The primary beneficiary of this application would be library staff and administration, although the service could be offered to other ICN users. The possibility of patron use certainly could exist, but whether or not there would be great demand for library patrons within the three-county area to conduct meetings electronically remains to be seen...although the same could be argued for the library itself. While travel costs could be reduced and meetings could be held with increased frequency, the high initial cost of the teleconferencing technology, scheduling problems, and lack of personal contact in meetings could be disadvantages.

(c) Cost

There are high initial costs for television cameras, modulators, switches, microphones, and studio or meeting facilities. The operational costs of a teleconferencing system would include camera operators, a control room director, and scheduling and administrative costs.

(d) Visibility

If available to the general public, and if in fact there was a need, the service could be fairly popular. The library user community would no doubt be intrigued by the concept, but the most obvious interest in this application would be amongst library professionals. This assumes that there is a demand for such a service or potential users in close geographic proximity, which is by no means proven.

(e) Future

A video gateway to a national satellite distribution system will permit the participating libraries to become terminals

for a nationwide or even worldwide teleconferencing network. Although the expenses involved in satellite distribution at first might seem exorbitant, library participation in the Public Services Satellite Consortium (PSSC) could make such an undertaking feasible.

(f) Bandwidth

One full video channel would be required for each participant in the teleconference. That is, for two libraries to participate in a teleconference, two channels would be required. This is not to suggest that such an application would not be feasible because only one channel has been allocated to the library. The possibility of educational institution cooperation with the library to share channel allocations would always be a possibility.

V. EVALUATION METHODOLOGY

Screening potential applications is a difficult task. Passing over a potentially valuable idea is the risk of inaccurate screening, while keeping ideas alive too long incurs excess cost and dissipates effort. Sometimes the screening standards can be set so high that no ideas survive, and in other cases the standards are set so low that useless alternatives will be retained. Industry experience has shown that screening new products is best accomplished with a multi-disciplinary group, affording the application of judgment and experience from several functional areas. The screening criteria should include considerations of the real nature of potential applications, the feasibility, and the value of the service. Screening decisions can be made based on judgment, weighted trade-off matrix analysis, or other comparisons to evaluate the criteria.

The Harnish Group uses a new product evaluation methodology which, we believe, is applicable to the evaluation of the 17 ICN alternative applications. At the outset organizational strategies, goals and objectives, capabilities and resources are determined, and combined with existing and forecast needs, target market information, possible solutions, and decisions to define opportunities. When opportunities and organizational requirements are established then decision factors and considerations can be defined. These decision factors boil down to three basic questions:

- Is it real?
- Can we win (Is it do-able)?
- Is it worth it?

Whether or not the opportunity (or the ICN alternative) is real is based on two questions:

- Is there a real need?
  - Is there a need/want?
  - Can the patron use it?
  - Will the patron use it?

. Is there a real service?

- Does the service idea make sense?
- Can it be created?
- Will it satisfy the need?

Concerning the issue of "do-ability," there are two fundamental questions that need to be answered:

. Do the advantages of the application out-weigh the disadvantages?

- Will it perform adequately?
- Will it be visible?
- Is the timing right?

. Can the whole system be built?

- Can it be engineered/produced?
- Can it be promoted amongst patrons and the user community in general?
- Are management and technical skills available?
- Are there other overriding considerations?

The final issue concerns the overall value of the effort. Again, two basis questions are involved:

. Is it affordable?

- Will the cost of the total system be something that libraries can afford?
- Will the value of the application be worth the effort and energy?
- Is the risk acceptable?

. Does it meet library needs?

- Does it support library objectives?

- Are external relations improved?

- Is there an overriding factor?

The very nature of evaluating alternatives at this stage of development implies a subjective process. Some quantitative information may be available, such as a general assessment of cost, the degree of technical difficulty in developing the application, and so forth. A methodology for assessing each application against the three primary questions (Is it real? Is it doable? Is it worth it?) must rely on the informed opinions of those ultimately involved in developing the application. While the authors of this report have made a determined effort to realistically assess the advantages and disadvantages and other factors involved in each application (even to the extent that the overall view may be considered pessimistic) the fact remains that given enough time, money, and determination virtually any of the applications could be developed. Realistic assessment by the participants of the three basic questions, the six underlying questions, and the 19 fundamental issues, together with an aggregate summary of opinions will, however, produce a highly reliable assessment of the most reasonable alternatives for implementation.

It should be noted that the 17 applications described may well spark an idea for still another application which is either a derivative of one of those included here, a combination of several, or a totally new application. This possibility, in fact, is one of the values of this approach. The sponsoring libraries or curious readers are encouraged to make a parallel assessment of new alternatives that they may develop, and subject them to this evaluation methodology.

Completed evaluation sheets, with applications listed in order of selection, will be found on following pages. Three blank evaluation sheets, with applications listed in the same order as this report, are also included for readers' use. To evaluate each alternative, a plus, zero, or minus score is given for each of the underlying questions. A plus carries more weight than a zero, but a minus is an overriding value. That is, a plus and a zero result in an overall determination of plus. A plus and a minus or a zero and a minus result in a determination of minus. For the overall evaluation, the same procedure is applied. If "Is it real?" is evaluated as plus, "Is it do-able?" is evaluated as plus and "Is it worth it?" is evaluated as a plus, the overall evaluation is three pluses and final score of plus results -- a winner. An overall evaluation with a single minus determination results in a final score of minus -- a loser.

ICN APPLICATIONS IN ORDER OF SELECTION (1/3)

ICN ALTERNATIVE APPLICATIONS	IS IT REAL?			IS IT "DO-ABLE"?			IS IT WORTH IT?			OVERALL EVALUATION
	IS THERE A REAL NEED	IS THERE A REAL SERVICE	OVERALL REAL	ADVANTAGES OUT-WEIGH DIS-ADVANTAGES	CAN WHOLE SYSTEM BE BUILT	OVERALL "DO_ABLE"	IS IT AFFORDABLE	DOES IT MEET LIBRARY NEEDS	OVERALL WORTH	
9. Programming	POTENTIAL, BUT NOT DEMONSTRATED O	OTHER LIBRARIES DOING IT +	+	TYPICAL TV APPLICATION +	NO SPECIAL REQUIRE-MENTS +	+	BASIC SYSTEM UNDER $10K +	MODERATE MATCH WITH GOALS O	+	+ +++
1. Radio Relay	NO ALTERNATIVE, BUT NOT DEMONSTRATED O	RADIO GEAR & ICN CONNECTION STRAIGHT-FORWARD +	+	STAFF & TYPE OF SERVICE OK O	TECHNOLOGY ESTABLISHED +	+	RADIOS & ANTENNAE UNDER $10K +	UNIQUE BUT GOOD MATCH O	+	+ +++
7. Software ILL	GROWING COMPUTER MARKET O	COPYRIGHT & AVAIL-ABILITY AT ISSUE O	O	ICN RELIABILITY POTENTIAL PROBLEM O	SIMPLE COMPUTER ARRANGEMENT +	+	R&D H/W AND S/W UNDER $50K +	UNUSUAL APPLICATION, BUT MATCH O	+	O++
12. Message Board	SOME PUBLIC LOCATIONS HAVE CARD VERSION O	MICRO-COMPUTER & SOFTWARE EXIST, BUT CAUSE O	O	RELIABILITY ISSUE O	EASY(?) IMPLEMENTA-TION +	+	H/W & S/W UNDER $50K +	MARGINAL MATCH, PUBLIC USE TERMINAL GOOD AR. O	+	O++
2. Audio Visual ILL	HI INTEREST, BUT UNKNOWN DEMANDS O	VCR OR VIDEO STRAIGHTFORWARD (OTHERS NOT SO...) +	+	SOME LEGAL ISSUES, BUT TECHNICALLY OK O	POSSIBLE transmission problems WITH SOME MEDIA O	O	2 VCRs MINIMUM SYSTEM COST UNDER $3K +	YES! +	+	+ O+
8. Sub-minute Facsimile	CONVENIENT FOR STATION, BUT QUESTION NEED O	DIFFICULT FOR OTHER THAN FLAT SHEETS O	O	STAFF RESOURCE ITEM, BUT GOOD ICN APPLICATION O	SOME INTERFACE ARRANGEMENTS POSSIBLE O	O	$6-8,000 PER MACHINE +	YES! +	+	+ OO+

ICN APPLICATIONS IN ORDER OF SELECTION (2/3)

ICN ALTERNATIVE APPLICATIONS	IS IT REAL?			IS IT "DO-ABLE"?			IS IT WORTH IT?			OVERALL EVALUATION
	IS THERE A REAL NEED	IS THERE A REAL SERVICE	OVERALL REAL	ADVANTAGES OUT-WEIGH DIS-ADVANTAGES	CAN WHOLE SYSTEM BE BUILT	OVERALL "DO_ABLE"	IS IT AFFORDABLE	DOES IT MEET LIBRARY NEEDS	OVERALL WORTH	
10. Training	NOT PATRON SERVICE −	QUESTION VALUE OF SHORT DISTANCE 0	−	BASICALLY TV +	LACK RECORDED MATERIALS, OR USEFUL 0	+	CAMERA & VCR FOR UNDER $5K +	GOOD INCREASE PAR. STANDARDS & REDUCE COST +	+	− −++
6. Library Usage Data Collection	NOT PATRON SERVICE −	SIMPLY DONE +	−	ICN RELIABILITY ISSUE 0	HOST MICRO-COMPUTER & SENSOR OK +	+	TOTAL SYSTEM UNDER $10K +	INCREASES AWARENESS OF LIB. EFFECTIVE-NESS +	+	− −++
17. Teleconferencing	NOT PATRON SERVICE, 2 FULLY QUESTIONABLE LIBRARY VALUE −	2-WAY TV IS ALL IT IS... +	−	NEEDS SECOND CHANNEL 0	STRAIGHT-FORWARD +	+	CAMERAS, STUDIO OR ROOM, ETC UNDER $100K 0	LIBRARY AS MEETING CENTER? 0	0	− −+0
3. Security	NOT PATRON SERVICE −	USES EXISTING TECHNOLOGY +	−	ICN RELIABILITY PROBLEM −	HOST COMPUTER & MONITOR PANEL REQ 0	−	COMPLETE SYSTEM IN EXCESS OF $100K 0	INCREASED PATRON & MATERIALS SECURITY +	+	− −−+
14. Electronic Mail	NOT PATRON SERVICE, NO PATRON NEED −	REQ H/W & S/W AVAILABLE +	−	REQ. GOOD SIGNAL QUIT & RELIABLE SYSTEM −	EXISTING EQUIPMENT +	−	$75-100K 0	INCREASED INFORMATION FLOW, DECREASED "TELEPHONE-TAG" 0	0	− −−0
4. Energy Monitoring and Control	NOT PATRON SERVICE −	EXISTING TECHNOLOGY +	−	ICN RELIABILITY PROBLEM −	HOST COMPUTER & SENSORS REQ 0	−	$50-100K (COMMERCIAL SYSTEMS CHEAPER)? 0	REDUCED ENERGY COSTS, BUT QUESTIONABLE 0	0	− −−0

ICN APPLICATIONS IN ORDER OF SELECTION (3/3)

ICN ALTERNATIVE APPLICATIONS	IS IT REAL?			IS IT "DO-ABLE"?			IS IT WORTH IT?			OVERALL EVALUATION
	IS THERE A REAL NEED	IS THERE A REAL SERVICE	OVERALL REAL	ADVANTAGES OUT-WEIGH DIS-ADVANTAGES	CAN WHOLE SYSTEM BE BUILT	OVERALL "DO_ABLE"	IS IT AFFORDABLE	DOES IT MEET LIBRARY NEEDS	OVERALL WORTH	
13. Computer Service Access	MANY APPL. WOULD PROVIDE PATRON SERVICE WHICH IS NEEDED, BUT MOST ARE TECHNICAL SERVICE 0	CONCEPTUALLY, YES; BUT NOT DEVELOPED 0	0	HEAVY DEMANDS ON ICN —	HOST SYSTEM VERY COMPLEX —	—	EXTREMELY EXPENSIVE HOST REQ ($100K+) —	YES! +	—	0 - -
15. Videotex	NOT DEMONSTRATED, BUT USEFUL CONCEPTS 0	EMERGING TECHNOLOGY 0	0	HEAVY DEMANDS ON ICN —	HOST SYSTEM COMPLEX —	—	EXPENSIVE HOST REQ ($100K+) STORER BUT... —	YES, WITH QUALIFICATION 0	—	0 - -
11. Telephone	NOT PATRON SERVICE —	EXISTING TECHNOLOGY +	—	SWITCHED SYSTEM SOME-OF-ALL 0	INTERCONNECT DIFFICULT —	—	RELEVANT PBX & HANDSETS MAY BE REQ ($100K+) —	REDUCED VOICE COMM WITH... MAYBE +	—	— - -
5. Teletext Relay	NOT DEMONSTRATED —	NOT YET —	—	INOPERATE TECHNOLOGY PROBLEMS 0	TELETEXT SERVICE DOES NOT CURRENTLY EXIST —	—	HOST, DEVICES ETC REQ ($100K) —	NEW MEDIUM, BUT... 0	—	— - -
16. Document Delivery	POSSIBLY 0	R&D —	—	TECHNICAL CONSTRAINTS —	DOESN'T EXIST YET —	—	CAN BE IMP AT ANY PRICE... YET —	YES! +	—	— - -

ICN APPLICATIONS WORK SHEET (1/3)

ICN ALTERNATIVE APPLICATIONS	IS IT REAL?			IS IT "DO-ABLE"?			IS IT WORTH IT?			OVERALL EVALUATION
	IS THERE A REAL NEED	IS THERE A REAL SERVICE	OVERALL REAL	ADVANTAGES OUT-WEIGH DIS-ADVANTAGES	CAN WHOLE SYSTEM BE BUILT	OVERALL "DO_ABLE"	IS IT AFFORDABLE	DOES IT MEET LIBRARY NEEDS	OVERALL WORTH	
1. Radio Relay										
2. Audio/Visual ILL										
3. Security										
4. Energy Monitoring and Control										
5. Teletext Relay										
6. Library Usage Data Collection										

ICN APPLICATIONS WORK SHEET (2/3)

ICN ALTERNATIVE APPLICATIONS	IS IT REAL?			IS IT "DO-ABLE"?			IS IT WORTH IT?			OVERALL EVALUATION
	IS THERE A REAL NEED	IS THERE A REAL SERVICE	OVERALL REAL	ADVANTAGES OUT-WEIGH DIS-ADVANTAGES	CAN WHOLE SYSTEM BE BUILT	OVERALL "DO_ABLE"	IS IT AFFORDABLE	DOES IT MEET LIBRARY NEEDS	OVERALL WORTH	
7. Software ILL										
8. Sub-minute Facsimile										
9. Programming										
10. Training										
11. Telephone										
12. Message Board										

ICN APPLICATIONS WORK SHEET (3/3)

ICN ALTERNATIVE APPLICATIONS	IS IT REAL?			IS IT "DO-ABLE"?			IS IT WORTH IT?			OVERALL EVALUATION
	IS THERE A REAL NEED	IS THERE A REAL SERVICE	OVERALL REAL	ADVANTAGES OUT-WEIGH DIS-ADVANTAGES	CAN WHOLE SYSTEM BE BUILT	OVERALL "DO_ABLE"	IS IT AFFORDABLE	DOES IT MEET LIBRARY NEEDS	OVERALL WORTH	
13. Computer Service Access										
14. Electronic Mail										
15. Videotex										
16. Document Delivery										
17. Teleconferencing										

VI. CONCLUSIONS

In the experience of the authors of this report, there is a dangerous tendency for those involved with technology (including themselves) to consider it a panacea. Throughout this report a deliberate attempt has been made to look at the real issues involved in the use of the Storer institutional cable network. While free access to a potentially significant resource is a particularly attractive prospect, careful attention was given to the other factors involved in developing an application using that network. Technical, management, and financial considerations may far out-weigh the advantages offered by use of the institutional loop.

The authors of this report, frankly, believe that, given sufficient effort and money, virtually any of the proposed applications could be brought from concept to reality. Indeed, if a given institution was willing to subvert its other goals and objectives to development of a particular ICN application, there is no fundamental reason why the project wouldn't be successful. However, such a strategy ignores practicalities involved in the day-to-day operation of community institutions and libraries in particular; and worst of all, it ignores the basic issue of need.

The most promising alternatives identified, using the methodology described in this report, appear to be locally produced television programming and a short-wave radio relay service. These applications best match library objectives, provide a real service to the patron, and are "do-able."

It is suggested that a formal evaluation process be undertaken, whereby each participating institution independently evaluate the alternatives using the described methodology. Upon completion of this task, a clear consensus should emerge as to the application(s) which should be pursued.

Once a particular application has been selected for development, preliminary planning, detailed planning, analysis, and design can be undertaken. During that process detailed information on the technical, operational, and financial aspects of the selected alternative can be identified. Upon completion of this phase, review by the participating libraries is essential to verify that the initial assumptions, selection criteria, and subsequent analysis merits the continued expenditure of effort and money on the project. Assuming a positive result, preparation of requests for proposal may be undertaken, and implementation begun.

"Front loading" of the project is strongly encouraged to insure that early detection and correction of bad assumptions, technical problems, and planning gaps is achieved.

In the late 60's, U Thant described the ability of technology to provide society with almost anything it wants as "the central stupendous fact of our times." Since that time however, advances in technology has provided opportunities far beyond what even U Thant might have expected in the Twentieth Century. As the world around it changes, the role of the library in meeting society's needs through technology will take on increasing importance. The foresight of the participating libraries in looking closely at the technological opportunities offered by Storer's institutional cable network indicates clearly that libraries will take a pro-active role in the future.

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ICN RESEARCH CONTACTS

Basnett, Milton	Multisonics	(415) 829-3300
Berry, Wayne	Comtech	(602) 949-1155
Birmingham, Mary	Metro. Library, Minneapolis	(612) 372-6500
Bradley, Lynne	Baltimore County Public Library	(301) 265-6983
Cable Television Information Ctr	Arlington, VA	(804) 528-6846
Dibler, Mary	LITA/Pub. Serv. Satellite Cons.	(202) 331-1154
Disken, Dr. Betty	Qube, Pittsburgh	(412) 456-1111
Dowlin, Ken	Pikes Peak Public Library	(303) 473-2080
Eggers, Lolly	Iowa City Public Library	(319) 354-1264
Feldman, Barbara	LITA	(201) 535-5803
Haggerty, Kevin	Tacoma Public Library	(206) 591-5666
Hammer, Don	LITA/ALA	(312) 944-6780
Holmes, Linden S.	CL Systems	(617) 965-6310
Ingersoll, Diane	Iowa City Public Library	(319) 354-1264
Jennings, Mark	Storer Cable	(606) 431-7766
Kenney, Bridgett (Bee)	Infocon	(303) 278-7411
King, Bill	Storer Cable	(606) 341-2552
Landers, Patty	Irving, TX Dept. Communications	(214) 253-2639
Leitzke, Noel	Minnesota State Library	(612) 432-2833
McVoy, Steve	Vice President, Coax Cable	(614) 236-1292
Miller, Bob	Atlanta Pub. Lib., Communication	(404) 688-4636
Miller, Nick	P.L. of Cols & Franklin Cty, DP	(614) 864-8050
Mulder, Elizabeth	Hightower Reg. Library, Rome, GA	(404) 291-9360
NFLCP	Kettering, Ohio	(513) 298-3482
Olenbush, Elizabeth	Qube, Pittsburgh	(412) 456-1111
Penn State University	Communications Department	(814) 865-2112
Pinder, Joanne	Anne Arundel County Pub. Library	(301) 224-7371
Rorrer, Phil	Avanti Communications	(401) 849-4660
Rothman, Steve	P.L. of Cols & Franklin Cty, DP	(614) 864-8050
Rufener, Jerry	Comtek	(602) 949-1155
Sager, Don	Elmhurst Public Library	(312) 279-8696
Stevenson, Carol	Qube, Columbus	(614) 297-2000
Sutter, Carolyn	Long Beach Public Library	(213) 437-2949
Sweeney, Richard	P. L. of Columbus & Franklin Cty	(614) 864-8050
Thompkins, Phillip	Univ. of Missouri	(816) 276-1531
Webster, Jim	Storer Cable	(305) 893-3070